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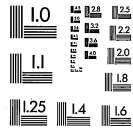

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Thomas A Edison Papers

A SELECTIVE MICROFILM EDITION

PART IV
(1899–1910)

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MISCELLANEOUS NOTEBOOKS

These ten notebooks, which are larger than the standard-size laboratory notebooks, served primarily as clean copy records, into which experimental plans and results were transcribed or in which data was tabulated. Three notebooks were used by Edison during the period 1902-1904 and annotated by him in later years. They contain compilations and transcriptions of notes and drawings on numerous topics, including batteries, electromotographs, phonographs, telephones, and other apparatus. There are also references to experiments concerning chemistry, electricity, magnetism, radiation, and thermodynamics. Six notebooks covering the period 1904-1911 consist of graphs representing the performance of batteries. The graphs were prepared from data collected by Walter E. Holland on experimental cells, Edison "E" and "A" type cells, and the batteries of competitors. Another notebook, used by Edison in 1907, contains tests on the solubility of lithium compounds.

Notebook, E-4296

This notebook covers the period March 1902-February 1903, with a few entries from 1919. It contains notes and drawings transcribed by Edison from other notebooks, including many entries from N-03-01-22 (see "Notebooks by Edison"). The experiments relate to a variety of matters, including phonograph record composition and molding, electromotographs and amplification, and the chemical properties of compounds. Among the entries are speculative notes on electricity, magnetism, and thermodynamics; a list of 285 experiments or groups of experiments to perform; and a list of compounds that fluoresce in the presence of x-rays. There are references to proposed "xyz" receivers and recorders, "marconi" waves, telephones, organic storage batteries, thermocouples, and other apparatus. There are also references to the work of physicist Adolphe Ganot (E. Atkinson, trans., *Elementary Treatise on Physics, Experimental And Applied: Translated and Edited from Ganot's Eléments de Physique*) and other scientists. Some of the entries are indicated as "entered from old books." Beginning on page 61 is a series of "notes from book of March 1902."

Notebook, E-4297

This notebook covers the period February-December 1903, with a few entries from 1912. It contains notes and drawings transcribed by Edison from other notebooks, including many entries from N-03-02-27.1 and entries related to material in N-03-12-29 (see "Notebooks by Edison"). The experiments pertain to a variety of matters, including electricity, electromagnetic radiation, phonographs, photography, and telephones. There are also lists of chemical compounds under headings such as "gelatinous substances," "gummy chemicals," "soapy chemicals," "pitchy masses," and "chemicals which can be drawn into threads"; and a list of slides used to test compounds that fluoresce with radium, with an indication that the radioactive samples were received from William J. Hammer. Other entries deal with amplification, phonograph recording and record molding, x-rays, storage batteries, and experimental apparatus combining cathode and other vacuum tubes with electrical devices.

Notebook, E-4298

This notebook was used by Edison during November 1904. There is one additional entry from 1927. It contains notes and drawings relating to experiments with alkaline storage batteries that may have been transcribed from other notebooks. The entries describe numbered groups of experimental cells to be constructed and indicate the results of tests performed on them. The groups of cells differ in their construction and chemical composition. Included are groups made with molasses, glucose, potassium cyanate, and various preparations of nickel hydroxide. Other groups are distinguished by differing treatments of cups and grids and differing charge or discharge conditions. The entry from 1927 is a brief note about a 1904 entry pertaining to iodides in electrolytes.

Cell Test Notebooks

These six folio notebooks were used during the period August 1904-September 1911 to graph the performance of various batteries. The first four books relate to Edison's alkaline storage batteries. Included are tests of experimental cells as well as the A4 and A8 production models. The fifth and sixth books contain data on cells manufactured by competitors of the Edison Storage Battery Co., including the Columbia, Eveready, Exide, National, and Philadelphia brands. Most of the graphs indicate that the data was collected or approved by Walter E. Holland. The plots were drawn by Holland, "A. C." (probably Alvin D. Caskey), and others. Each graph provides information on charge and discharge conditions, and most pertain to several cells or several tests. Titles are stamped on the front cover of each book. The four volumes relating to Edison storage batteries have been selected.

Chemistry Notebook

This notebook was used by Edison in May 1907 to test the solubility of several lithium compounds.

Notebook, E-4296

This notebook covers the period March 1902-February 1903, with a few entries from 1919. It contains notes and drawings transcribed by Edison from other notebooks, including many entries from N-03-01-22 (see "Notebooks by Edison"). The experiments relate to a variety of matters, including phonograph record composition and molding, electromotographs and amplification, and the chemical properties of compounds. Among the entries are speculative notes on electricity, magnetism, and thermodynamics; a list of 285 experiments or groups of experiments to perform; and a list of compounds that fluoresce in the presence of x-rays. There are references to proposed "xyz" receivers and recorders, "marconi" waves, telephones, organic storage batteries, thermocouples, and other apparatus. There are also references to the work of physicist Adolphe Ganot (E. Atkinson, trans., *Elementary Treatise on Physics, Experimental And Applied: Translated and Edited from Ganot's Eléments de Physique)* and other scientists. Some of the entries are indicated as "entered from old books." Beginning on page 61 is a series of "notes from book of March 1902." The book contains 301 numbered pages. Many pages are blank; pages 1-4 have been removed from the book.

April 24 1902 JAE

Experiments for making a recording cylinder for Master records which shall diminish the friction offered to the record cutter on the diaphm, The present wax is not only hard but has a viscosity suffct to make continuous shavings and the friction is great, Not only is there a pressure against the lever by the pressing of the wax when cutting but up and down movements due to the sound waves must be made against this friction produced by the pressure of the revolving wax. It is this friction which prevents the harmonics of the fundamental notes from being fully recorded, While the friction is a small part of the energy in a fundamtl wave, it is a large part or an important part when it comes to the weak harmonics, and also to the gradually dying out of of fundamental, It would seem that a softer wax would offer less friction, This strangely is not true, The friction is greater, and the viscosity greater causing deformation work to be done, The hard material has less coefct of friction & less viscosity, hence the harmonics are better recorded, After innumerable expmts made during several years I have traced the trouble of getting records of good tone quality down to the above + find that to obtain perfect quality it is necessary to discover a material for recording which shall 1st Have no viscosity or drag

2nd To require scarcely any power to remove material hence small friction to up + down movement of the Cutter, as well as thrust on the cutter lever,

3rd To have a smooth surface when cut so as to give no scratching sounds

4th to give off very little if any vapor so the record surface can be coated with gold by the Vacuum process or if possible by chemical means, phgo etc

5th Not to absorb water when put into the Electrolytic plating bath for depositing the backing

I find after much expts that a record blank of this character is a very formidable proposition

April 24 1902 J.A.E.

The nearest approach to it up to date is the formation of a solid cylinder by pressing with the hyd press Zinc Oxide, The pressure being about 50 atmos per sqr in. This is bored out put on a phono, Turned true by the saphire knife, The recorder has an advance point of large radius which is in advance of the record, The Reader therefore rests on the cylinder.
The zinc ox is an excessively fine powder, so fine that the particles can scarcely be seen by a Microscope but the cohere by the pressure, The knife removes the material as a fine dust, leaving a very smooth groove + record and there is scarcely any friction or work to be done = The cylinder is very porous and easily indented so no reproduction from it directly is possible but if put into the Vacuum + gold plated, and then the oxide made to absorb a low melting point paraffine it can be put into the Electrotypic bath + plated thickly + used in our reg moulding process; After plating the Zinc ox cylder is removed by soaking in alcohol + water when its becomes crumbly
A precipitate formed into a cylinder either by pressure or a soluable binder is the right principle I think —

I have tested a large number of pressed precipitates etc

Nickel Phosphate, Strontium hydrate, This would carbonate + may not be reliable, Barium Carbonate this is nearly as good as Zinc Ox it cuts harder than Zinc at same pressure; Bismuth Sub-Carbonate cuts easily its close to ZnO — Acetate Strontia fine grain cuts very easy but I had to powder in mortar + there were grains, possibly it could be got free chemically, or by floating + decanting from powdered material, Acetate of Mercury if it could be got fine + even it would be ideal scarcely any power required to record,
Lead Sulphate not so good — ZnO Lead Carb if grain was finer wld be good —

April 24 1902 JAE

Note - Tannate of Tin when pressed 150 at transparent, polished cut just like an exceedingly hard wax, but far harder than anything we ever had, This is a new lead, pressed salts of organic acids & inorganic bases. 150 at,

Aniline Green if ground fine would press to a wax? 150 at

Material marked Sulphate of Antimony. which may be Sulphide? when pressed 150 at, cuts smooth like wax, it has checks, if made fine chemically or by floating it could be pressed to a very hard cylder giving a smooth cut and powder for chips = 150 at

Stannate of Soda when fine is hard, 150 at

Nitrate Mercury. when powdered is hard + like a wax - 150 at,

---

Experiments with the slides containing 48 receptables each containing a seperate lot of chemical crystals mostly by wet crystlzn, mostly double salts, up to date I have 75 slides made,
To test the phosphorescence I went into the dark room, remained 20 minutes + then had Fred Ott bring in 2 slides at a time, the slides were exposed for 15 sec to the light of a ~~mark~~ naked arc with 65 amperes 3/8 Carbons Slides held 12" away in 5 seconds I had them before my eyes, the Double doors prevented any light from getting in when Ott entered —

April 24 1902 JAE

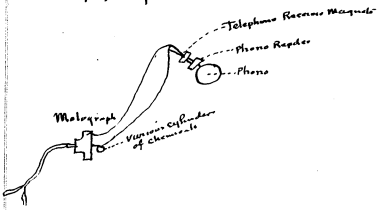
75% of the slides showed phosphorescence, any fully 25% of each slide containing 48 sets of Cryst were phosphorescent, nearly all ceased to phos in 5 sec a few remained for 10 to 15 sec —
The following phos'd for 10 to 15 sec

No 8070 Cresotinic acid + K_2Co_3 + $BaCo_3$
" 7173 Borocitric acid + $SrCo_3$ + $Al_2(OH)_6$.
" 4807 Cyanide of Thoria + Cyanide of Bismuth
" 5006 Cyanide Pot + Chlorides Copper + Lead
" 5081 Cyanide Pot + Chlorides of Barium + Aluminum
" 5175 Cyanide Pot + Chlorides of Cerium + Strontium
" 5077 Cyanide Pot + Chlorides of Barium + Ammonium
" 4700 Cyanide of Zirconium + Cyanide of Silver.
" 2705 Acid hydrofluoric + NH_4OH + $PbCo_3$
" 1075 Barium Carbonate, latter only small section of crystals ∴ Thus dont understand this —

Tried putting in a rey cylinder in wood alcohol to dissolve out some of the ingredients so as to give a porous easy cutting non viscous surface — The Alcohol does it, but the white surface is dragy + viscous, It will be necessary to make a special soap or wax compounds so that the viscous part will be dissolved out leaving the powdery non viscous material behind — Walter Miller is working on this with ideas suggested by me,

May 4th 1902

Molograph Exp'mts



I find that when Phonograph started & reg Bell put in at Mologr, young Ott could just barely, barely detect the sound, but when Mologr put in it so loud and has at least 2/3rds of the volume of the original sound, The quality is perfect—

Following cylinders have been made and tried, 150 atmos pressure

Wet with 3% Solution KOH

Venetian Red absorbs lot solution, smooth, tends to squeeky not loud, polishes, loudness 1/3rd of $BaCo_3$ cylinder

Oxalate Manganese smooth 1/3 loudness $BaCo_3$ take considerable solution.

Alumina Oxide Rough, dont take moisture well no sound

Oxalate Barium Takes solution well 3/4 as loud as $BaCo_3$ can probably improve it by varying pressure of making. It polishes & is smooth.

Sulphophenylate Barium Dont take liquid,

Ammoniated Copper, Broke

Lead Sulphate made only few turns when cracked pbly no good heard nothing.

Stannate Soda Wldnt take liquid.

Ammonium Sulphite, Dont take moisture

Ammonium Benzoate "

Fluoride Copper, rough, no sound,

Carb Soda Anhyr — no sound

Strontia hydrate fair volume sound, broke out, soft,

Nickel Phosphate Low, very smooth, polishes good
may be good if pressure varied

Barium hydrate very rough, just hear it, too hard,

Copper Monochloride — no sound

Acetate Mercury. KOH Kills it, no sound,

Antimony Tartrate no sound, rough,

Chalk 2/3 loudness $BaCo_3$ —

S S Barium Carbonate A1 - best yet! Tough, cylinder nice
easy to work, polishes beautifully, stands heavy pressure
Loudest of all so far tried, made in press with 150 Atmos
pressure, Am going try various pressures, and various
moistening solutions

Barium Peroxide — very hard, at certain degree of
moistening, loud as chalk + nearly as loud as $BaCo_3$
over wet it then went bad - Experiment with it

Copper Formate NG

Sulphate Potash NG with KOH, should try water

There is little doubt but that I shall be able to reproduce at a distance sounds louder than the original, This will permit the devising of an app for Deaf people, a telephone Repeater, Recorder for telephones, or Improved Telegh System ——

May 6th =
Further tests of cylinders for Molograph

Zinc Carbonate Noisy 1/2 as loud as $BaCo_3$

Carbonate of Magnesia Lumpy noise 1/5th as loud as $BaCo_3$

Magnesia Oxide turns bad in lathe, chips out, rough barely hear music NG —

Iodide Lead, Chips out in turning in lathe No sound.

Cobalt Oxalate fairly good surface polishes, Sounds low

Cobalt Cyanide 1/4 of loudness $BaCo_3$ polishes nice. Dont take moisture,

Copper Iodide dont take moisture, no sound, bad surface

SS
Fluoride Calcium pretty good = Phenomenon ..
wet it 1st with Kott 2@5/- loud + good, kept wetting it more got hoarse, then wet it with water immediately got louder
Make another one or 2 Try water only at 1st.
polishes smooth but not so good as Tungstic acid
but it is so good that it must be put in the 1st class of Tungstic acid, Chalk, $BaCo_3$. WO_3 standing best so far

S S

Tungstic acid cylinder is the best so far found it has fine properties, polishes beautifully smooth, a black surface forms. It is very smooth and scarcely gives any sound except slight lumpy sounds when I turn fast & these are probably due to mechanism or eccentricity of cylinder. It takes lots of KOH, probably combination takes place, It is as loud as the best $BaCo_3$ without the scratch & lumpy sounds, Can turn slower without change in volume of sound than $BaCo_3$ or others so far, The quantity of Music is fine,

The Palladium contact was turned to a 3 inch radius so its always adjusted now which is a great gain,

May 9 1902

A lot more cylinders have been tried will enter them Sunday One cylinder has turned far superior to any so far it is

Carbonate of Strontium S S

This cylinder is about twice as loud as any so far, takes lots of KOH made them at 50 100 125 150 200 250 300 atmospheres pressure all were nearly alike, 300 was harder & not so soft for sound & 50 was rather soft as it would be liable to be over moistened & injured I adopted 200 atmos pressure made a large number, find that a cylinder put in small paper box had to be wet again after 15 hours no sound give probably surface moisture evaporated & absorbed by paper box — Will try putting in tin foil — Tried a palladium flat about 3/8 wide instead of the 1/16 wide there was no gain in loudness,

It would not stand as much resistance inserted in line as smaller piece, but it would undoubtedly stand a heavier Current + give consequently a louder sound,
Where the line has large resistance, the point should be made as small as possible,

Thinking the Current generated by the Turning of the Cylinder might perform some function I tried inserting a cell of Leclanché + regulating its Current to stop or oppose the Chalk Current but was unable to do so,
A Condenser put in line stopped the Current,
4 or 5 Microfarads reduced sound 1/2 I should say
I noticed a tendency after 1/2 hour of spots on cylinder getting hard + giving no sound —

Moistened a Tungstic Acid Cylinder with Dilute Sulphuric acid loudness about 1/4 of $SrCo_3$ = This is first instance of obtaining sounds with an acid solution, " "

With good $SrCo_3$ + 1000 ohms I cannot hear Bell receiver whereas the Microph sounds could be heard by me in the room —
Altogether $SrCo_3$ may be considered perfect as far as can be now seen,

$SrCo_3$ 200 atmos pressure wet with 20% KOH, is by far the loudest and best yet.

$SrCo_3$ 200 At, wet with saturated Sol of SrCl. 1/8 as loud — Wet with BaOH 1/5th as loud —

following cylinder tried 150 at.

Mercury Succinate, no sound takes but little KOH

$SrCo_3$ 200 at water only ½ to ⅓ loudness of 20% KOH

$SrCo_3$ 200 at 1st wet with concentrated glycerine, with stick of KOH dissolved therein – ⅛ loud of best, wet ontop of this with H_2O ⅓ loud – this shows that probably considerable glycerine could be mixed with the KOH
tried $SrCo_3$ at pressures varying from 50 to 300 atmos – from 100 to 300 there is apparently no difference, adopted 200 at.

Copper Benzoate. KOH, nq – KOH, 20% – 70% alcohol – no sound –

Bond paper disks made into cylinder dont take up much KOH – no sound. the Bell Magneto gives currents too weak for this probably ——

Animal Charcoal – just hear it.

Sulphide Mercury – just hear it no sound, hard, rough – takes lots KOH –

Effloresced Sulphate Iron little rough, takes KOH good no sound –

Bismuth Sodium Salicylate very smooth, scarcely takes any KOH – No sound, try Alcoholic KOH,

Stannate Soda no sound dont take Rott,

Fluoride Iron smooth polished Track takes in Rott fine precipt ferrichydrate, Freddy can just detect sound — Strange?

Rawhide, takes very little Rott — no sound to perfectly smooth, waxed work probably with strong Current

Soapstone rough — no sound dont absorb Rott,

Nickel Oxide very smooth, sounds very weak —

Oxalate Nickel swells up + cracks must be pressed wet so wont swell up, dont hear sound —

Tungstic acid — Very smooth so smooth cant heal scratch with tin takes, only wants moderate pressure + speed, loud about 1/2 of best $SrCo_3$ tried a new one with dilute sulphuric acid, same degree loud — This is 1st Track where an acid solution has given good results — try Molybdic, Tungstic. Unusf phosphomolybdate of quinchen wet Rott try phosphoric K,

Bismuth Sub-Carbonate about 1/2 loud of $SrCo_3$ — takes plenty Rott, tends to squeak, probably pressed to hard — Vary the pressures!

Strontium Phosphate takes lot Rott, 1/3 loudness of $BaCo_3$ — smooth —

Try Arsenates Fluorides,

Zinc hydrate, dont take KOH. Rough – no sound

Magnesium fluoride. 2/3 loud of $BaCo_3$ – smooth takes pretty KOH – Vary it

Zinc Carbonate smooth. H_2O first KOH 2nd no sound

Bismuth Oxychloride takes KOH fine scarcely hear anything –

Aluminum Hydrate – pretty fair takes KOH very slow not smooth, lumpy ½ loud of $BaCo_3$ – something in it Vary it

Barium Hydrate Very rough – Dry – no sound

Cadmium Iodide – Dont take KOH no sound smooth,

Copper Carbonate, rough no sound

Calcium fluoride wet with H_2O no – with KOH, not so loud as 1st one something wrong somewhere,

$BaCo_3$ turned off in mandril. 300 at loud rough – hard – 200 at safter about same loud 150 at very much safter (?) smoother + good, Cant hear roughness when music coming louder – polishes ok – Notice to slightly crystalline under Micro while $SrCo_3$ shows no signs of Crystlzn – this is poly reason $SrCo_3$ is so much superior to Chalk or $BaCo_3$ – $BaCo_3$ + $CaCo_3$ wear pen while $SrCo_3$ dont ?

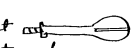
Made some metallic balls like phono reproducer balls about 1/32 or more dia —

Iridosmium on $SrCO_3$ — No sound ?? } Strange ?
Iridium ball — 1/2 loud of reg
must be something in surface action of the metal,
I notice when a ball is used there is lots of lumpy sounds — not produced by the flat surface.
The Ball is evidently impracticable & reg —

Tried pen made of a flattened Crystal of Pt Henry Magnetite, no sound — but it has very high Res —

Iron pyrites pen 1/3 loud of $BaCO_3$ —

Gold point on $SrCO_3$ — about same as palladium — think can use it as a substitute if cheaper — track blackens while Pd does not, this seems to make no difference in loud, although in time it might go bad —

Put in a Palladium wire point 
gave 3/4 of loud of Reg — but no lumpy sounds like Ball —
I notice that with this track pens 1000 ohms inserted when pressure is heavy 1/2 the loud, whereas when pressure is light can scarcely notice any change — office lessening the pressure reduced sound 1/2 = This is probably due to great increase resistance of chalk & 1000 ohms becomes a small part of the total —
Effort concentrated over smaller area
Tried platinum ball — 1/3 loud — cut surface —

Bismuth Oxalate, 3/4 load of $BaCo_3$ —
takes KOH slowly it was pressed too hard, try
varying pressure think there is something in it,

Cerium Oxalate, takes KOH poor, Rough, just hear it

Strontium Oxalate - good as $BaCo_3$ —
smooth, takes up enormous quantity KOH —
very porous —

Uranium Yellow started good — KOH swelled
softened it. Make another moisten with KOH.
Etc,

Mercury Chloride — turns black by KOH,
no sound - squeeky —

Zinc Oxalate Can scarcely hear -

Hg Chloride Sublimed, squeeky - no sound —

Aluminum Hydroxide, started up good - 3/4 load
of $BaCo_3$ Lumpy - busted when put too much
pressure on takes KOH poorly there are 2 hydrates
got from Merck dont know which one this is —
Retest diff pressures —.

Calcium Carb precip — rough - takes little KOH
1/2 to 1/3 load of $SrCo_3$ — broke, this old standard says
is evidently poor material Compared to $SrCo_3$ —

Bismuth Iodide Rough no sound decomposed
by KOH —

Walnut Hide, no sound dont take much KOH —

Left a $SrCO_3$ in closed telephone all night full loud when left - next morning 3/4 loud without rewetting, Think in closed chamber with sponge it will not require wetting more than every 2 days possibly much longer —

Box wood Cephalin, Ivory, Sheepskin — no sounds —

Cadmium Oxalate 1/5 loud of $BaCO_3$ — rough —

Barium Sulphide — no sound — so squeeky Cant work it, dont take KOH —

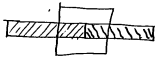
Cerium Carb — 1/3 loud of $SrCO_3$ — dont take in KOH good — pressure too great on making =

Note = Think every material gives best results when made at a certain pressure —

Today finished & tested a Receiver with small phono diaphm — its very much better & 25% louder than with big dia — it had a built up Mica dia same as used in new reproducer of phono — am going try stiffer diaphms tomorrow — will probably get it even louder — Hereafter I adopt the small diaphms

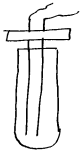
Jany 10 1902 Entered from old books

Thermo—



1 A ferrule of a metal having a very small expansion is reamed out and the thermo couple are ground to size that gives fit when cold On heating thermo expands more than ferrule & is thus under great compression Iron probably best, for ferrule. Might try a couple under hydraulic Compression —

2 Try mixture of the salts of a good thermo alloy & reduce by Zinc etc & Compress – also plate the alloy if it will plate Electrolytically

3 

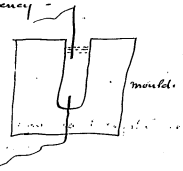
See if passing 100 Volts thro non conducting liquids, any become luminous in dark— might try higher voltage also coil sparks. Electrodes in later case well insulated as they emerge from liquid—

No 4 Put in sealed tubes cold saturated solutions of salts Then add some extra salt cryst then heat to dissolve these Extra crystals, then cool tube the crystals will then be formed under pressure, See if changed – Try fluorescing Crystals if fluorescence changed—

5 Crystalize some hot saturated solution of Cuprocyanide of Potassium The fluorescing kind under powerful X rays see if there is a change in the fluorescing power, Try also Uranium Nitrate + Benzoate, and all other fair X ray fluorescing crystals in neg book of original experiments, Also try Oxalate of Lithia to see if X ray changes its character as an arc light fluorescer— Also crystalize a mixture of Oxalate of Lithia + Cuprocyanide of K together Also Oxalate Lithia + platino barium cyanide + other X salt in mixture to determine any change,
Test them as X ray fluorescers + for Light fluorescence.

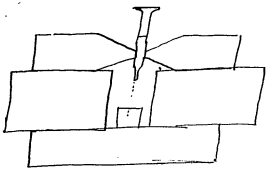
6 Try some Stobie Nickel ore as a thermo, melt + cast some also, it melts wonderfully easy.

7 Try casting some of best thermo alloys in powerful Concentrated magnetic field— Try with iron mould + brass mould Also in soapstone pressed powdered lime &c Try putting wire top + bottom of mould so powerful current passes as it crystalizes may change crystalizn + raise efficiency -



8 For thermo make 5% out of all the acid forming metals with basic oxide forming metals Cr Wo Ur Mo Ar Sb S Te Se Si - should be good with K Na Mg Hg Fe Ni

9 See if viscosity of organic & inorganic liquids, or same with salts dissolved therein is changed in a magnetic field, by light free from too much heat & by X ray -



also try liquids with iron salts, with X ray try phosphorescent salts, Also very sensitive hydrometer,

10 = See if X ray alters surface Tensions, bubbles, camphor floating etc,

11 Crush out flat best thermo see if destruction of crystals impair thermo efficiency.

Duplicator

12 Stress Tourmaline (crossed to be opaque) by Magnetism Elec alternating, X ray + note effect on light.

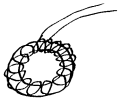
13 Be sure and make some very fine Calcium Tungstate mixed with powdered magnetite 1 of $CaWO_3$ to 2 of magnetite 400 to 600 mesh + put on paper to make sharp X ray photos, the opaque magnetite preventing side lights + blurring —
Do something with the phosphoroscope to get sharp photos prevent light from going sidewise, Note Aug 18 1919 should be analogous to Lumiere's Color screen plates

14 Get glass diffraction grating say 3 or 4000 lines, Vacuum flush with silver then gold, then plate in Copper bath + strip from glass.

Square cell with Copper sulphate

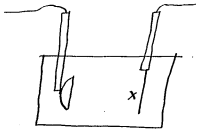
15 polished gold plated electrodes — placed sidewise in powerful magnetic field, + plated by a weak current; see if more on one side than the other, (10) see if plating follows lines of magnetic force,

16



Closed ring of iron in oil under hydraulic pressure get throw on galv with pressure on + off.

16

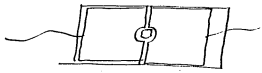


Electrode of Copper concave + focussed on silver plate x slight current, shellac back see if Electrolytic lines can be focussed,

17 Photograph in a powerful magnetic field, ditto in high vacuum —

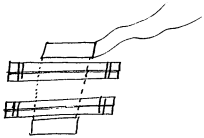
18 See if passivity of iron is destroyed in magnetic field, use polished iron plates,

19 Use pin head drops of crystalizing solutions on polished clean glass prepared and crystalized
1st in the dark
2nd in Magnetic field
3rd in X ray field
4th glass electrically charged all around thus



5th in good light,
6th Suddenly by heat,
7th in presence of certain non crystalizing substances
8 in different solvents,

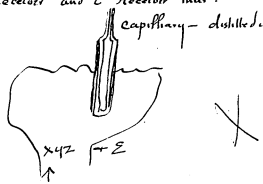
20



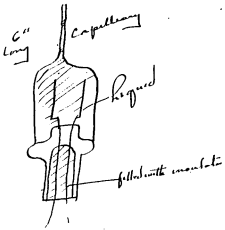
2 polished iron tubes within coil, pined together at one end then one tube twisted as far as possible in one direction + the other in the opposite direction + then pinned together get throw on galv before + after torsioning –

21 Reading in Phil Mag that diaelectrics expanded on stressing independent of the charge then make an XYZ Receiver and E receiver thus.

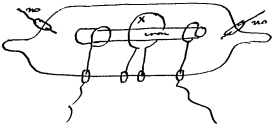
capillary – distilled water + other diaelectrics



22 A Better device than in 21—



1st get vacuum then break capillary under the liquid & let it go in—



23 Iron CP— Silver cone X determine Kick with + without vacuum— Vac should be so no spark passes
Use separate bulb with sparking point to determine when Vac good, make Kick exports while on pump—

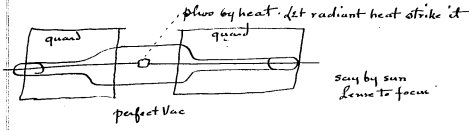
B. Battery Cell—

Crystalize Oxalate Li + X ray fluorescence in chloride of great solubility also ~~other~~ other salts of great solubility. to see if crystals change also from
24 different solvents and in presence of different things also rapid + slow crystalizing + in dark—

25 Try plate Cobalt on Iron
Copper " "
Brass " "
Silver " "
Zinc " "
Cadmium " "
Gold " "

Then put in chamber pass hydrogen + see which metals weld to the iron and approx the temp, think all will stand or yellow except perhaps Cd + alloy at surfaces making them integral as with Ni + Fe
Try plate iron wire with platinum by coating with Pt Chloride pass it + bring to weld + repeat + then draw + repeat + have Dally try for Vacuum —
I think platinum cylinder could be forced over iron rod and welded in Hydrogen by heat it could be drawn down + be used in lamps if not Fe then Ni or Co,

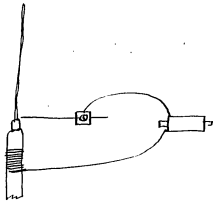
26



This will show if radiant heat pass perfect Vac ← make crystal phosphoresce,

27 Rig up sensitive balance for weighing so scale beam at one end is in conc magnetic field See if weight of dif substances same with field off + on, also saturated solutions hot + closed to air change wt on cooling + crystalizing

28

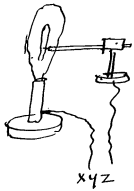


Sensitive flame, Sensitiveness is at the orifice of burner make slot fine + connect spark coil across, also use Ethereic spark. also 2 pieces foil on a glass tip + C try various dances to alter flame, X ray field, also along wire, a beam of X

29 Meusels double Iodide of Hg + Cu blackens at 70 cent if painted on paper + starts to blacken Heat Photo also heat of Electrolysis. platinum point, chemical paper try if blackens by C + XYZ

probably Electric X rays

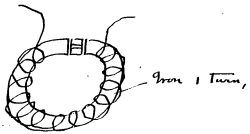
30



Platina tube or Ni tipped with Grafite pencil. in inner flame any C or XYZ. Tear off C + increase luminosity flame locally near point, Should be Marconi. too –

31 Get some Acheson Grafite sticks

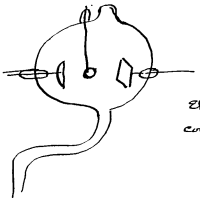
32



Air gap take kick + then insert the buttons made for molograph see if any substance changes kick —

33 Put telephone Molograph Recvr in conc magnetic field + with constant phono Record see if on + off of field produces change.

34

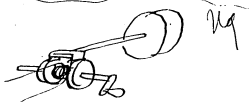


look out for static attraction better use Electromag than static bz constant.

Exhaust to X ray stage then to perfect Vac try outside magnet to attract while getting Vac see if diminishes when spark goes thro

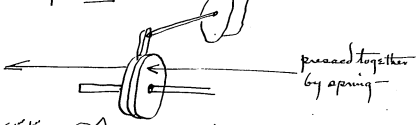
35 Best thermo alloy 1st test then put under greatest hydraulic pressure, retest, also one end pressed other not, press several alloys also iron to iron one pressed the other left soft —

36 Motogh. possibly platina point rubbing on cylinder made of best thermo alloy etc will act by current generated by the rubbing heat to increase & diminish friction, if circuit used & key opened & closed & we get an effect on diaphm then this arrangement would act as a very sensitive Elec receiver as the incoming current would neutralize the thermo & the alternate waves strengthen it it would also do away with difficulty of wetting chalk might act as XYZ Recvr —

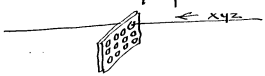


37 Magnetic Motograph, if rotating mag be laminated might be very sensitive, should be permanently magnetized might be good telephone Recvr —

38 Design a Motograph with a disk of glass. or other transparent substance This disk rotates, pressing against it is a metal disk connected to Emg — A ray of light or heat or X ray or XYZ passes thro the friction surfaces thro the glass, changes the friction, This might be a very sensitive Recvr for light, X ray heat possibly Electrification by disks of metal in proximity —

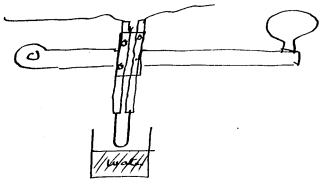


39 (XYZ) Recover Use small dry plate, (photo plate) interposed in dark cover, between poles of a circuit over which XYZ proceeds



40 Heat a loop of wire made of dif metals Loop to be worked by a Key or loop dipping in water a heated by battery also flame. sudden evaporation sending an (XYZ) wave over wire Use Fe Ni Co Zn Cu Pt Pd Sr Cd brass & other metals

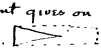
Metal heat wave by bolometer



41 – Some phenomenon should come out of passing waves through junctions of heaviest + lightest metals, Tungsten + Mg di. etc,

42 By making a thin plate of Celluloid say 20/1000 about 4X4 covered by disks of metal say ½ inch diameter making each disk a separate metal of those which can be got in disk form and then laying the plate of disks over a photo dry plate covered with thin black paper we get a XYZ Recorder, The wire carrying XYZ being connected to each disk say 10 minutes test this with all sources of XYZ 1st test by leaving it 24 hours on photo plate to see if metals themselves give any rays also 24 hours after metals have been exposed to good arc light for 10 minutes also after heating all the disks also after being in strong Mag Field

43 See if Nickel will displace Cu as a commutator bar where carbon brushes are to be used.

44 XYZ Tellurium point gives on chem telgh a dash like this 
gives it that way no matter how long current kept on this is strange especially as there should be no polarization on moving paper Its the hydrogen pole Why does it cease? Perhaps its not the effect of Electricity To test this see if Te morse signals can be Tailed out by using Res + Condensers try + get smooth paper or an Alumina hydrate surface on paper or metal surface of phono record, If not due to E then unlimited speed is possible on Cables with Te point It may be a XYZ Recor—

Notes from book of March 1902

45 Sensitive chemical paper for recording by the Current + XYZ =
Tellurium point. H pole
Ferridcy K + NaCl ½ + ½
Iodide K 1 lb. gal with starch,
Try Selenium point (crystalized)
" Alloy Pb 10 Se 90
" 20 Se 80
" Te 80 Se 20
Te 50 Se 50
Surface coated Ni hydroxide KOH moist raise to Ni_2O_3 by ct,
Chloride K + phenolphtalein, H side
Pb hydroxide, reduce to black by H,
Iodide K starch + phenolphtalein, Double pen or reversals
Silver pen Chlk organic matter surface expose to light + develope. 1919 Paraphenylene diamine

Monel metal for Commutators, its higher Res

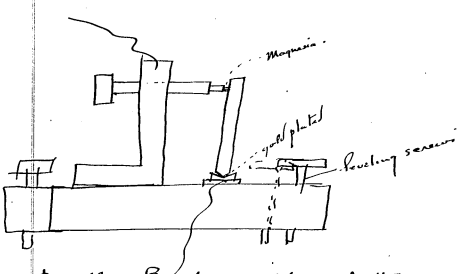
46 Use metals for chem paper points + base of same kind + a solution of the metal saturated, there will be a depositing solution unpolarizable deposit will scrape off by moving surface + give black deposit on Hydrogen side,

47 Chem paper Continued Aniline hydrochloride + Ammon Chlorate mixed ditto Chromic acid
Zinc cylinder + Zinc point. Paper moist Sulphate Zn also try amalgamated point, also KOH saturated with ZnO —
Cu Cu CuSO4 Ag Ag Nitrate ag
Ag Ag AgCy+K Pb Pb acetate pb, also
Pb in KOH — Fe Fe — Sulfate Fe Ni Co
cylinder + point in Sulphates,
Bi Bi + Nitrate Bi Cd Cd sulfate Cd
Sb Sb KOH saturated with acid oxide
Prussian blue KCy, Hydrogen side gives K + destroys Color
Hyposulphite Na or K with dif metal points

48 Two dead flat surfaces of Magnesium 1/2 inch square buffed May with its own pressure be insulated by the thin film of oxide when in contact in case where the Emf is extremely low + yet at higher Emf it will conduct by static may act as a Branly Recvr with telephone Possibly a weak current in shunt with telephone it would when rapid alternations come cause conduction take place + Local current would pass through telephone possibly a flat pen of mag or two decks worked a la Motogh would answer using Magnesium —

49 Possibly a condenser of extraordinary capacity could be made with Aluminum or Magnesium foil resting one on the other in high vacuum. The oxide serving as the dielectric. If the capacity is directly as to the thickness the C would be immense. possibly foil wont do but ground buffed disks essential.

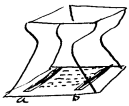
50



Possibly a Branly could be made thus as above. Levelling would make pressure more or less.

Spark Ethric. Dark box

57



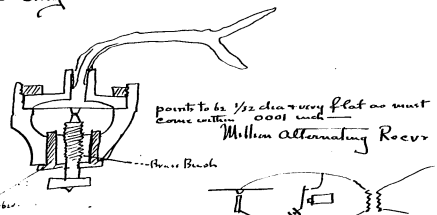
a + b strips gold plated surface between say glass photo graphite dusted between, possibly hydrofluoried surface better + graphite rubbed on.

52 Wonder if storage battery be made iron wire — 1/4 dia wound with wire like mag iron 1000 ft long.

53 Tried paper soaked in strong Sulphate Ni then dropped in KOH, with 4 Bunsen only got poor mark as chem recorder think there was insufficient Ni hydrox stirred be heavy coated or solid cylinder It could be mixed with Magnesia hydroxide dried to a powder, compressed + then wet with KOH,

54 — Try semi-dry hydroxides pressed in H press for Emg —

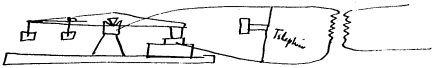
55



Relay shows when in contact + by self induction stops rapid alternations also contact et changes air gap —

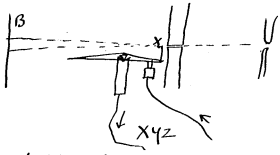
possibly points of Mg or Al. might work in actual contact, possibly the rapid alternations might cause the local et to circulate might try in place of relay a galv or telephone, Also oxidized points Fe Cu Pb Zn Cd Sn possibly Mg for one point + Fe for the other etc If actual contact will do the most would be practicable,

55 Cm What may be a better instrument if result is to effect current + not make a sound is this



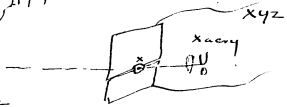
possibly a very fine point is required to come the effect, of the alternations

56



Movement of X 1/1000 000 inch moves B .005 when 4 ft dia Hole about .010 inch long
or use point

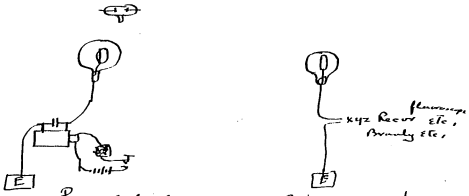
X crystal to refract by XYZ



XYZ passing thro Cryst bends ray—

57 Possibly an X ray tube is the only efficient way of making good contact with the Ether, free of matter space telegphy might use it, it would be etherically non polarizable so to speak and many poles would not be essential just one pole + a bulb,

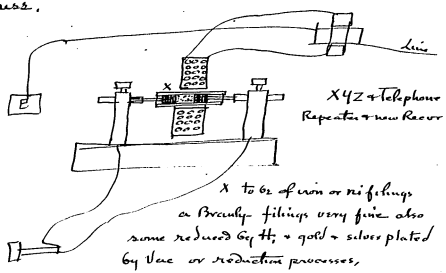
57 Continued



Possibly bulbs must be exhausted beyond X ray stage if beyond then X42 Recvr would be necessary not Brauly or fluoroscope.

58 To make solid blocks of crystalline substances powder them up and moisten very slightly, with concentrated solution of the substance, then subject to hydraulic pressure hot, experiment to get them clear Try large crystals and crush in mould Also dehydrate the crystals + then moisten with H_2O + press.

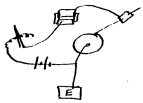
59



X to be of iron or ni filings or Brauly filings very fine also some reduced by H_2 + gold + silver plated by Vac or reduction processes,

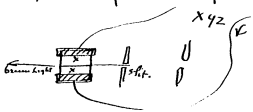
thinks it will auto decohere,

60 For sensitive chemical paper device thus.



Use of a good inductive magnet & a weak current which can be controlled by a resistance & have the current in such a direction that it tends to make a mark but does not quite do so, the incoming current then has not the same work to do, this should enormously break down the res or polzn & make chem paper much more sensitive,
With KI + Pt or Te point the constant current is to this what the perm mag is to a telephone,

61

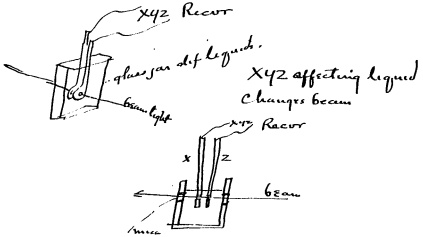


× × ground Crystals, X4Z refract & move beam——

62 Perhaps thermo couples which give no current when heated might give X4Z Use X4Z Recvrs & test those on hand, Emgraph, telefone etc.

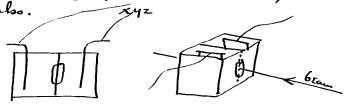
63 If thermo good couples are a question of the combination of an acid forming Element like Sb with a basic forming Element like Zn & high atomic wt is required then Wo with Mg as an alloy or Wo with Al Zn etc be good.

64



possibly beam should have shutter & be vibrated
" X solid to absorb beam.

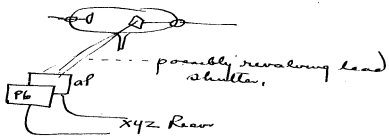
Try for liquids Ether, Conc H_2SO_4 Glacial Acetic, Trichloroacetic CS. Anilin oil, Cassia Sassafra Benzol Mirbane, Distilled H_2O Alcohol Et & Me Chloroform Kerosene Paraffine oil – Butter of Sb – Etc. Try Conc soln of salts, using electrodes same kind metal both sides to eliminate Elec repeat absorbers of light & radiant heat.
Try X rays also.



Beam passes junction either in one liquid or the other seperate by Mica also animal membrane.

65 In X ray tubes make several with dif residual gases left in make one filled with MgO with Reg Electrodes. make a very small X ray tube ½" size,

66



66 Platinocyanide of Ba dissolved in Collodion or Gelatin + dried Crystals will be very fine and showed quite very sharp photos for X ray

67 Bismuth oxide combine together + one double oxide loses O at 130 Cent. possibly can be used as sub for Ni in storage bat

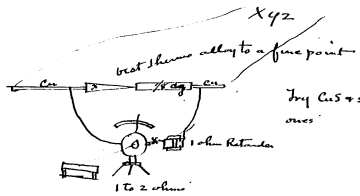
68 for thermo Alloys of Se + Bi Zn Sb etc

69 Collect all the Platina in lab for making from the scrap the fluorscq salts + light salts,

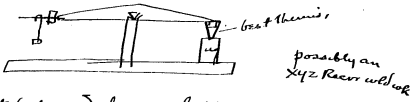
70 Inexpensive Fluorescens can be obtained by laying the round mica disk flat, + pouring a few drops of the concentrated solution on it + let the H_2O Evap in most cases the crystals formed will adhere

71 Prism. of fused material can be cast between plates of glass at proper angle;

72

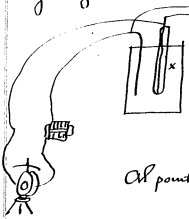


or at X a vibrator + very sensitive telephone of very low Res



almost balanced to give light pressure

73 Platinum will not amalgamate because there is a very thin layer of something on it. Think it could be used in Brauly by soaking charcoal powder of right size in Pt Chloride + heat in Hydrogen



x glass tube with the smallest possible point exposed to liquid pt also Zn Zn + Sul Zn + other non polable conditions

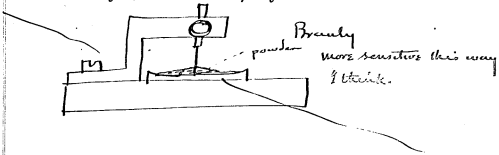
At point 1/4 of $\frac{1}{1000}$ exposed plate large A.P.

74 It is probable that a photo positive could be taken direct by making a dry plate with emulsion of Black hydroxide of Ni; then expose to light the light may not be sufficient to reduce it to $Ni(OH)_2$ but by using a developer not strong enough to reduce $Ni_2O_3 H_2O$ to $Ni(OH)_2$ would be strong enough to reduce the part acted on by light, (ie) light + the developer together could do it. The $Ni(OH)_3$ is endothermic & as Voltage is as good as AgO it ought to be just as sensitive providing a proper developer could be found, it would be cheap.

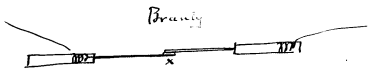
75 Dry plates soaked in dark in solution oxalate Lithia, dried, + then used to photo by arc light showed be very sensitive.

76 Try a sheet with crystals on, expose to arc light 5 minutes. then insert in dark box with photo dry plate + a pattern see if photos also see if goes thro opaque paper.

77



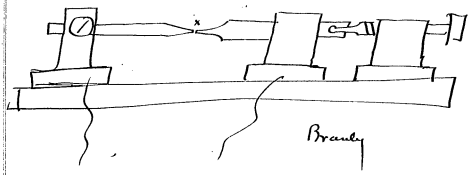
78



x wires have mica bet + whole smoked with Lampblack.

79 Darkbox Ethric,

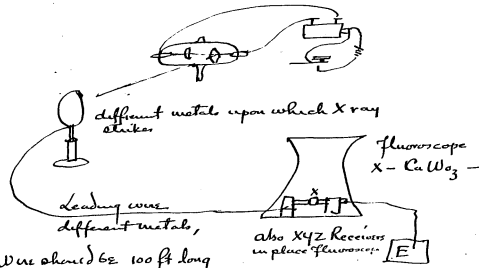
X smoked across with Lamp & Pack



80 – Make 2 or 3 oz for Expmt of crystals by $CaWO_3$ fusion method All Tungstates of metals Molybdates & others by fusion + NaCl –

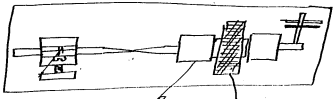
81 Make Sulphides by fusion process of Ba Sr Ca Mg Be Thoria, Zr All Mg etc. for phosphorescence Expmts –

82



Wire should be 100 ft long to get outside influence of tube.

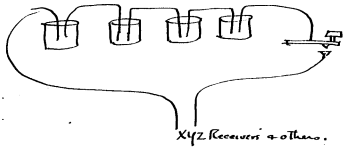
83



Ivory insulation, This is to be made on hard rubber base made very fine & accurate to go in a dark fluoroscope box with hinged bottom & also to be used under a Microscope in a dark room —

84 See if X ray explodes Iodide of Nitrogen, also if Ethereal does it acting on Brauly.

85 Generators of XYZ —



Use Carbon Electrodes for one & one of following for the other
Ag Cu Zn Sn Pb Fe Ni Sb Bi Co Al Mg CuS.
Te Pt Au Cd Pd FeS Fescale Cu scale
Use following solutions
Conc H_2SO_4 CS ditto with extra Sulphur dis
also following dissolved in it Oxalic A, Chromic A
Acetic & Sulphates Sol Therin
Next Solution Chloroform — ditto with Rosin ditto with
Bromine Iodine, S. Pyridin Aniline Ferric Chl
$HgCl$ Key KSulphite & Sulphide. Picric A
Trichloroacetic A also all Organic radicals with
metals & Organic bases

85 Cont Another liquid Glacial acetic acid with following dissolved in it Chromic a. Br I HgCl $FeCl_3$ S pyridin Aniline Trichloroacetic acid, Key Oxalic a, HCl, Nit a, phos a, add more

Trichloroacetic acid with following dissolved in it Br I S $FeCl_3$ HgCl K sulfite KS CrO_3 Key Oxalic KOH, HCl nit a,

Then Ether with $FeCl_3$ HgCl. Br I. S K sulfite. CrO_3 Key Oxalic KOH.

Absolute Ethyl. with Br I S K sulfite, KS Mirbane Picric acid, CrO_3 Key Aniline, with Vanadate NH_3 + Cu salt, Oxalic a KOH + others.

Benzol with Br I S K Sulfite. KS HgCl $FeCl_3$ Mirbane Picric a CrO_3 Key Aniline Cu + Va oxalic KOH.

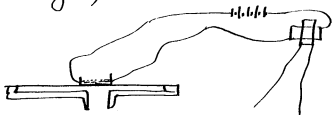
Pyridin with all the above
Liquid Chl Tri —
Acetone
Aldehyde
Chloral Hydrate
Phenol + others
probably best will be CP Benzol + dissolved Stuff —

86 Perhaps Bichromatized Gelatin will have chromic a reduced by XYZ or Eho + that the oxdzd gelatin is not deoxdzd by Ct if so it would act as a substitute for Bromly with a film $\frac{1}{1000}$ inch point slowly moved 1/2 the alternation doing work —
Think Aniline black by Electrolysis is not reducible. it is formed by current but after formation is neither Oxdzble or reducible
also possibly ferrous oxalate + Chl Ag or a dry plate film — The Hertz wave would have one half raise Fe Oxlate up to ferric ox + the other wave could not reduce hence a record.
The recording point would have to be fine + the surface perfect.
Try Aniline Hydrochloride see watts 2nd Sup. 77
Sulphoacid of aniline pyrogallic with
Nitrite K — O of K oxdza pyro + alkali free
use 2 pens one in line with the other,
Also pyro + a salt of lime — free lime causes pyro absorb O blackens also a K salt
try paper tinted with all the Aniline Colors + platina pen to see if any Color reduced by Current or XYZ.
To keep recording surfaces just moist enough to Conduct + still appear dry use Chl Li CaCl, NH Nitrate ZnCl MgCl use in water little NaCl Chlorine will react to give O.

87 = Break off 1/2 inch piece of the country rock collection I have powder + put in reg chides for fluorescing Experts,

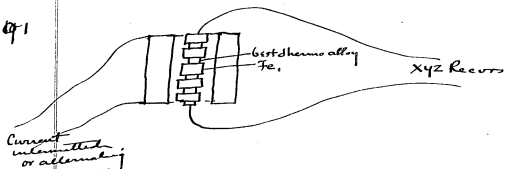
88 Organic liquid battery.
Liquid base Acetals
" Acetic acid in which are dissolved the hydrates of the metals – alkaloids + organic bases Chromic hydrate dis
All deliquescent salts soln Alcohol.
also Nitrates fused CaCl, Dichl Sn Baryta.
[Sesquichl Fe Protochl Fe Nit Ca + Proto Mn combine]
Try the Ethers Sulphuric Oxalic etc.
with dif chemo dis.
Also Chlorinated Hydrocarbons with dif Chemo dis

89 ~~[illegible]~~
A bar of iron held against a grindstone + grasped in the middle + at the ends Keeps cool in the middle but so hot at end cant hold it, investigate,

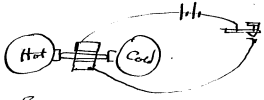


90 – Telephone
Use silver between Electrodes just put enough battery or Emf on to cause Branly to cohere make Current or rather Emf adjustable,
On talking each vibration decoheres + battery recoheres + so on it should be very loud,

91

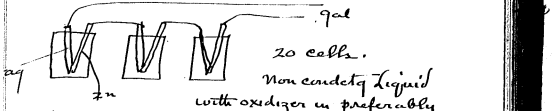


92

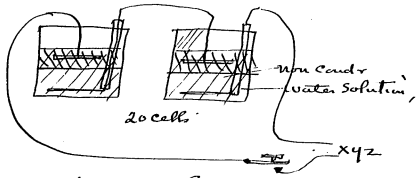


See if any def of current is off or on coil,

93

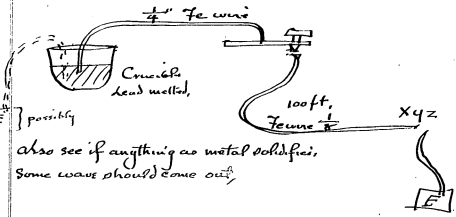


94



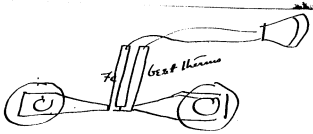
arrange Electrode so the one in non conducty is very near the Conducty Solution,

95



also see if anything as metal solidifies,
Some wave should come out,

96



Big mag see if any changes when mag energized

97 Organic liquid Battery
Chloride Sul ditto with 60% S dissolved.

98 Sulphur Mon Iodide heating S & I together
Even under water solid, melts 60 C.
probably soluble in Organic liquids

99 Crystalized or metallic like Selenium probably act like Tellurium as a pen point on Chem paper

100 Possibly in Organic liquid bat grids of Fe & Ni could be used no oz could make cheaply

101 Boron Nitride heated in a flame fluoresces with a bright greenish white light

102 Iodide of Methyl good for Organic Bat its mfd on large scale,
Methyl Sulfite normal) stable liquid
" Sulphate "
Methyl Sulphuric acid no odor syrupy stable forms salts, sol Methyl alcohol.

102 Cont, Nitro methane heavy liquid weak acid
Salts very explosive
Lead Methyl liquid, unaltered in air OK.
Tin Tetramethyl liquid stable
Iodoform CHI_3 only 0·26% H good to
dis in liquids
Chloroiodoform oily liquid $CHICl_2$
Formic acid liquid,
following salts combine with anhydrous
Ethyl, acting as water of Crystzn,
$LiCl$ $CaCl$ $MgCl$ $NiCl_2$ Mg —
Na Ethylate, dis Na in alcohol,
Ethers are the oxides of alcohols.
Ether dissolves (not acid ethers) S P I Br CrO_3
$FeCl_3$ $HgCl$ $AuCl$ $PtCl$, Seul other Chlorides
+ Iodides + a few salts,
Ethyl CHl_3 Iodide + Bromide Sulfite Liquids stable,
Oleic acid, glycerine with Chemo dis in it,

103 Scheme friction induces P or Neg E in powdered
material for instance Rosin + Red Lead, one
becomes P the other N If mixed & blown against
two bulbs one is P charged the other N.
Rosin will come on one Pb on the other,
there is thus a perfect seperation, Try 2 bulbs
or balls on glass rods one P other N.
+ Rub or shake some Sunderland Conc see if
Phos is made P or N, Orz sepn scheme S.

104 It is stated that rubbing a puncture of a
thermos gives a current that ceases the
moment Rubbing ceases + is not due
to heat, but to molecular vibration see about it,

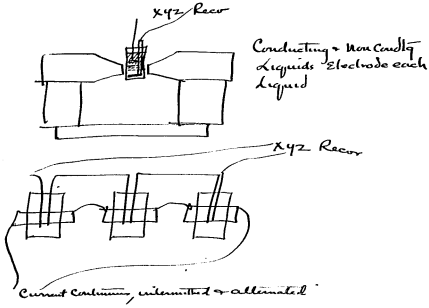
105 Arsenic + Sn Chlorides liquid non-conductors.

106 Organic Liquid Bat,
Chromium Oxychloride. Liquid, sometimes called Chlorochromic acid, Mobile Liquid boils 118 C Sol in acetic a.
Molybdic Di Chl Sol alcohol + Ether. also Pentachl Mo.

107 Vapor of Chromic Chl passed thro red hot tube gives violet prisms of $2Cr_2O_3 + CrO_3$ which are Magnetic Why ?.

108 Organic Liq Bat, Hexachl Tungsten Sol CS.
Uranic Nitrate Sol Ether

109 Tungsten Bronzes conduct well easy made make pound Each for Exput telephones, XYZ & otherwise.

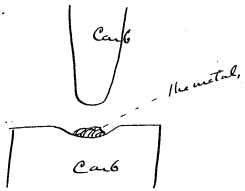


110 Organic Liquid Battery.
Tetrachl Sn thin fuming liquid mixes all proportions with Br + CS.
Tetraiodide Sn Sol CS Absolute Al, Ether Chloroform + Benzol. Tribromide + Triiodide Sn Sol CS.

111 Phosphide Tin Sng P. Coarse crystalline mass like cast Zn Conds, try thermo,
Vanadium Di Oxide V_2O_2 metal like, Conducts E. Try telephone + thermo,
Vanadium trioxide V_2O_3 in powder pressed together Conducts E.

112 Obtain from Foote or English lot Rock Salt + cut plates + lenses, prisms,

113 Here is a chance to test by eye + Photo plates all the slides with monochromatic light from the different metals in arc light Especially Violet metals, giving most intense lines in Blue, Green, Violet + Ultra,

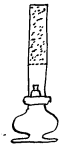


It is possible with say Mg that with very strong light of one refrangibility will find specific crystals that will be in unison + fluoresce strongly which might not fluoresce at all with a weak line of the metal,

114 Buy some dry plate Emulsion in Gluck bottles for Expt.

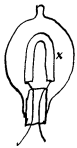
115 See Watts on re Fluorspar, perhaps a magnetic or Electric stress continuously applied will cause continuous phosphorescence by heat + thus give a fluorescent Lamp.

116 Tourmaline Cryst becomes Electl by heat? one end P other N. its Electrifier must have very high Voltage, possibly a mixture of fine Tourmaline Cryst. + a substance which will fluoresce or phosphoresce by E when mixed + heated would give Light

117 

Long chimney filled with phosphorescing crystals on sides phosphog by heat below red,

Kerosene

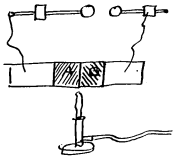
118 

x Thin sheet metal coated with crystals of phosphorescing matter phos below red heat, or foil of iron or CrCo alloy coated with phosphg crystals,

119 Test magnetism different metals at a red or white heat with pointed poles by mag using wires + bunsen burner, possibly some metals might become magnetic a heat higher than normal.

120 Test best thermo alloy cooling slowly against pouring in mould see which gives best voltage

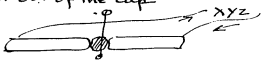
121



Have an idea that pressed blocks of precipitates like Oxalate of Calcium which become electric by heat, or powdered crystals in blocks put together + coated with metal and heated at juncture or all over one giving Pos the other Neg should give plate glass machine effects especially if a number are put together.
If heating all over will do then disks can be used.

ditto sealing wax
sulphur etc

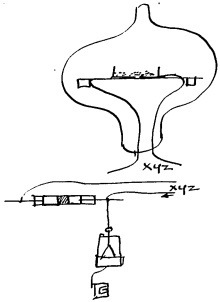
122 Dry Oxalate of Calcium when stirred with a glass or platinum rod becomes so electrical it can be lifted out of the cup



piece Oxal Ca between points by XYZ passing excites Oxal Ca a pith on thread attracted,
See Special book for substances Elec by heat,

Powdered Tourmaline, Oxal Ca

123



Like divided cup on Iceplume Ag powder Vac when XYZ or E Comes coheres.

Mixture Oxal C + Ag powder for Branly

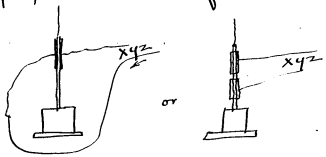
124 Condenser Mixture Oxal Ca alone as dielectric or mixed with Rosin.

125 Find a fused salt that will dissolve Oxalate Calcium

126 Make complete set Oxalates, Double Oxalates, use Oxalate Ca as impurity in other fluorescers

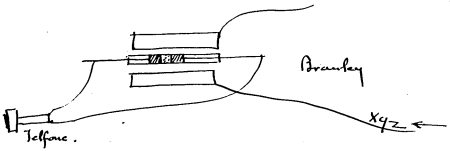
127 Make a very high note whistle and arrange that air vibrations pass a narrow passage between two insulated disks. Use instead of Branly The E or XYZ waves serving to change the quality of the note. This should be very sensitive use listening tubes

128 Make a capillary glass tube through which Acetylene gas passes and has a fine needle like flame



Tin foil around glass tube, XYZ electrifies or changes gas + varies flame

129



See if coming + going of lines of force cuts Ag particles makes a local current + the whole attract instead of action of current direct

Organic liquid storage Bot,

130 Glycerine $C_3H_5(OH)_3$ Alcohol of a triad Radical

Ferric Chloride seems to be a general Organic reagent Its soluable in many Organic liquids acts as Oxdyr

Ethylene Oxide forms the link between Organic + Inorganic Chemistry Its neutral yet a powerful Base Unites with HCl as strongly as Ammonia, Its an ethereal liquid

Boiling 14 Cent $\begin{matrix} CH_2 \\ CH_2 \end{matrix}\rangle O$

Diethylene Dioxide $\begin{matrix} CH_2 \\ CH_2 \end{matrix}\rangle O\,O \begin{matrix} CH_2 \\ CH_2 \end{matrix}$ boils 102

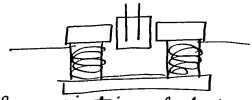
131 Crystalize a rapid good crystalizing substance with needles in a very strong moving magnetic field, have it hot, let it cool off + crystalize Notice if any different arrangement of crystals from a duplicate solution not in field but made at same time under same conditions

Also try 3 or 4 drops on hot glass, microscope slide in field + out (Magnetic) then can examine closely + try great number of substances rapidly Use pointed pole + big Magnet,

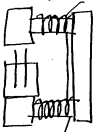
Could put few drops on glass with a crystal or so heat glass + dissolve crystal + then let is evap and crystalize in + out of field —

Might try in + out of arc light beam also X Ray —

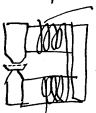
132 Organic Storage Bat,
fused chlorides are decomposed by current, no water therefore say HgCl dissolved in an organic liquid with Hg at bottom cell and a grid of Carbon with Graphite mixed with a trichloride which goes to a Pentachloride when charged, this is only an example.
The dissolved active material acts as if fused
The Organic liquid is simply another way of fusing (or) dissolving it so molecules are free to move. Strong solutions should be good
Conductors even when organic is good insulator
Its not necessary organic should dissociate because there is no dissassociation? in fused Electrolytes, The main thing is the Electrodes to bring about conductivity



possibly combinations which do not conduct in a powerful Magnetic field — by orienting the molecules —



It is possible that light + X ray fluorescers Crystallizing in a powerful magnetic field might fluoresce different or gain or lose it altogether



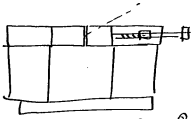
Iron dish with paraffine Coat, Thin for crystlzg

133 Select all the good X ray fluorescers and recrystalize many times, also recrystalize from every solution they are soluable in,

134 Make Tungstate Calcium using instead of NaCl, Every other fluxing salt that will work & produce cryst, may get CaWO4 more sensitive than platinocyanide of Ba —

135 Crystalize Light + X ray fluorescers in strong static field,

136



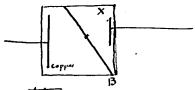
Big magnet with one part of pole piece adjustable to form a spectroscope slit also put a spectroscope slit in Magnetic field Concentrad & see if magnet affects lines of metals —
It may make a difference of what metals slit is made of

137 Try X ray fluorescers in a powerful Magnetic field also 1000 Volt constant field, also Cold & hot environment,

138 Make by fusion process Uranates of all bases for fluorescers — rares & all. also melted Uranates by water crystlzn.

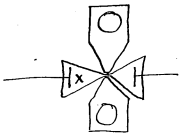
139 Make liquid cell with small spectroscope see if powerful Magnetic field changes the absorption of different parts of spectrum of different liquids Try static field, also try solutions with same electrodes & solutions of their own salts when powerful Electrolytic action is going on Try a large number also alternated fields.

140



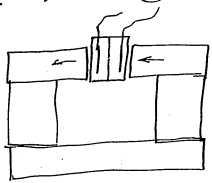
B insulating partition, with spectroscopic slit 001 Electrode in X side polished silver, Liquid is a prism, other Electrode polished Copper or silver, electrolyte Acetate Lead, or $CuSO_4$ – pass current & Phenol by Electrode & perox Lead with show Electrolytic spectrum, or lines, if any result try mixed Electrolytes & poles of alloys

141



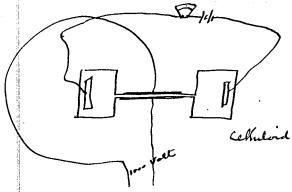
X is double cell with very narrow slit connecting

Whole placed in field use electrodes with own salts

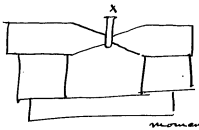


also divided cell with slit parallel to Lines of force

142

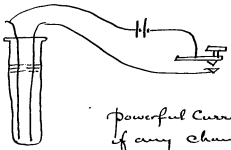


143



x test tube try chemical Color reactions note any change in Color of reaction, also if any change at moment of reaction in the magnetic lines, by galvr + Induction,

144



powerful Current passing see if any change in chemical Color reactions.

145 Put Brauley in cone mag field see if better or worse

146 It is possible some of the crystals which carbonize without melting if carbonized slowly and then put in Lime arc furnace and heat to a terrible temperature by radiation might go to Carbonadi, Especially those which crystalize in the right system,
Also Anthracite + Carbon from Sugar might do the same if pure + free from Fe which Acheson says tends to cause formation Graphite, Fe + other things, Cl Carbon is what is wanted,

147 I remember when I first subjected things to high temp in arc I got iron that gave wide manstande figures also feather crystals with iron, possibly metals mixed or with chemicals might at very high temp change; Try iron kept at high temp by Elec furnace for long time & then analyzed for other Fe metals & Co Ni ___

148 It may be that a disk of rubber revolved very rapidly between poles of Cons Magnet having a tube of hot liquid which crystalizes when cold wound of revolved that cold some phenomena might occur Try fluorescence.

149 Try with isomorphous crystals all the solutions that give crystals in the same system make a mixture & get a compound crystal, also keep saturated solns seperate form & crystals then remove the crystal to the next solution & so on till compound crystal produced. Try for phenomenon Xray & fluorescence, phos;

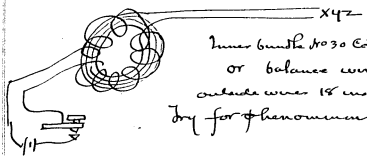
150. Perhaps metals deposited Electrolytically might act quite different as thermo Elements as their crystaline arrangement would be different, possibly best thermo alloy could be deposited & have the value increased possibly depositing Ni Co Fe in powerful magnetic field when worked regular the result is heated this way it is formed without heating hence results as thermo may be entirely different. possibly tin lead silver & other deposit of crystals formed with current of great density could be pressed in form.

151 It is possible that a boiling saturated solution of a fluorescent salt if suddenly poured into a liquid in which crystals are insoluble which liquid is 10 deg below zero or over a chilled Copper plate in thin layer so it would Crystalize instantly that the crystals would be more unstable & be better fluorescers

152 Try all the Ni Co Fe single + double salts Crystalized in Conc magnetic fields + Current stress, X ray field —

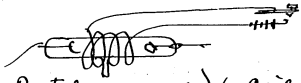
153 Bore out a large Chemical crystal, wind as a ring transformer with fine wire, get kick on galv, try many crystals,

154



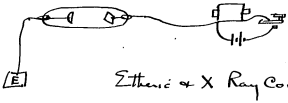
Try for phenomenon

155 Make X Ray bulb one inch dia 6 ft long see phenomenon



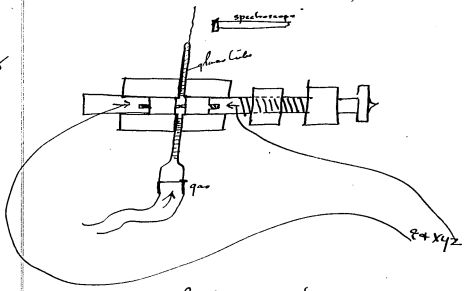
156 X Ray Ray tube surrounded by Coil powerful Current, also ditto in Mag field, field + Current, also in Oil, 3 together; Try further Exports X ray tube in Oil,

157



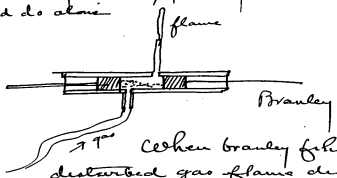
Etheric & X Ray Coil, notice phenomena.

158



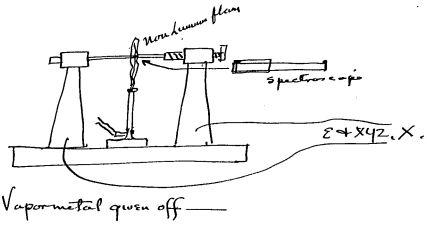
points made between glass tubes formed of unmagnetised points or metal points which when E or X Y Z comes jumps the space between points say 1/4 of /1000 such a vapor of metal carried up in gas gives spectrum in flame.
possibly two fine points of a conducting sulphide of metal, giving strong lines or alloy with lithium Na etc. This ought to be marvelously sensitive, possibly Te or As would do alone

159

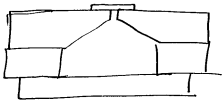


when brawley filings disturbed gas flame disturbed.

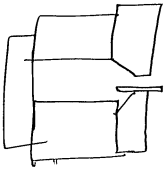
160.

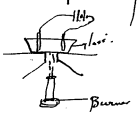


161



See if fluorescing crystals still fluoresce or changed Na Or non fluorescers become fluorescent also phosphorescers. Plate glass Crystalizing Solutions heat + Cold — Use non plate. Crystalize on that also Cu plate, in light + darkness in X ray + while Current passing liquid. When crystlzg + all together,



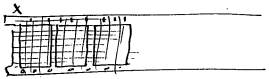


162 Most Nitrides of metals Conduct E. make all for Thermo,

163 Mercuric Methide has highest specific gravity of any known non metallic liquid, 3.069 — flint glass floats on it, Its a powerful Alkaline Base,

164 Sesquioxide of Cu Cu_2O_3 mixing Chloride Lime with Nitrate Copper beautiful rose Colored substance, Its the Calcium Salt of Cupric Acid —— Gobelin made for Cu Bitting.

165 Strip for Kinetoscope. I find gauze cloth held close to strip while projecting does not effect the picture,



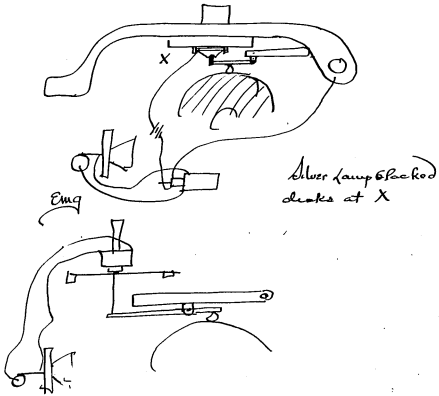
X 0025 steel strip where picture go so punched out, feed holes punched in — gauze cloth stuck on, strip laid flat + Gelatina silver emulsion run over strip + dried then printed on from Negative taken by reg Celluloid strip, ought to be 3 time Cheaper ——

166 X ray phosphorescing material might be mixed with Dry plate Emulsion + print itself ——

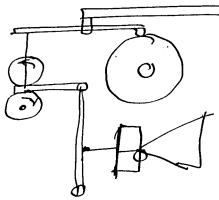
167 Make all the precipitated fluorides & then bring them to red or higher heat they may fluoresce as precip $CaWO_4$ does when heated & not before.

168 I think there may be lots of precipitates of chemicals that can be pressed to tough cakes by hydraulic pressure say neutral precipitated stearates of metals insoluble phosphates borates fluorides sulphates oxalates that are gluteinous or amorphous It is possible that very finely divided NaCl could be pressed into a transparent block

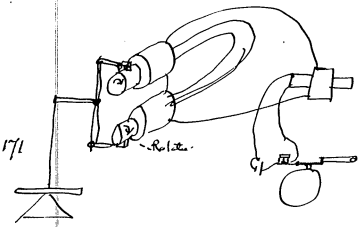
169 Phonograph Mch 21 1902.



170

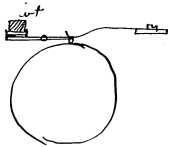


171

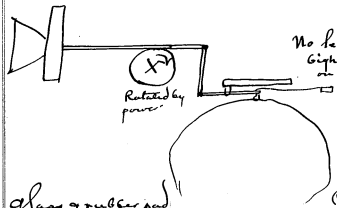


phonomagnetic

172



173



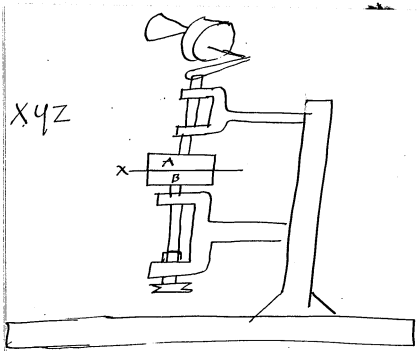
No leverage but mechanical Light produced by Rotated disc on X 500 to 1 inch. when a pressure on 1 by sound wave make a pressure of 2 or more on X & then amplify sound wave

glass & rubber pad, allow one impedant glass out slightly.

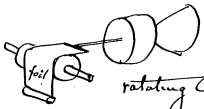
mechanical bite.

174

XYZ

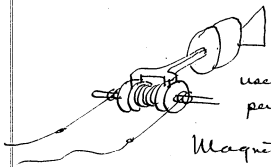


A B metals lapped flat. X dielectric possibly ? magnesium disks lapped flat, only oxide surface, possibly two lapped surfaces of different metals perfectly clean when rotated might hug when a current passes possibly hug on going from metal A to B & let up on going from B to A. films could be used when large field for Exmpt with this that impossible with Chalk Malogh,



rotating Cylinder with different films on ferro cy Cu etc,

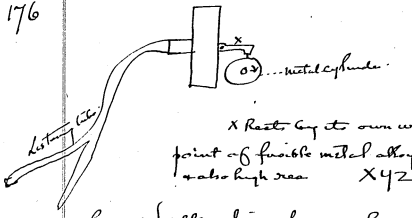
175



use only one leg
permanently magnetize it

Magnetic Matogh —

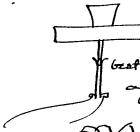
176



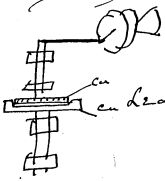
X Rest by its own weight.
point of fusible metal alloy also cylinder
+ also high res. XYZ receiver,

for rapid accumulation - freezing Res of alloy
should be very high at point to make high R.

177 Telephone,

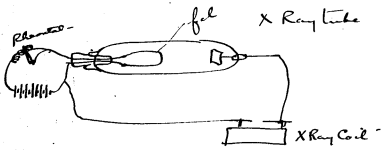


best Nickel alloy we have try
against



178

179 Crookes in Vacuo.



Notice phenom

180 Glow Lamp by oxidation, fill 3/4 full of mixture of MnO_2 or PbO_2 + magnesium powder etc, heat, until reduction takes place should glow in high vac if dry—
possibly Fe by H, + PbO_2 or MnO_2
also Ferric Ox from Oxalate + Fe by H,

181 Pass City gas to Burner in photometer & pass sparks through gas before burning see if enriched &c also Sparks with Carbon points.

182 Will a Soap phenom soap bubbles mixed with Fe by H go up in air + follow the Earth lines or a magnet in room—

183 Andalia

put in powdered transparent 10 mesh phosphorescing materials for fluorescent lamp notice best point of vac with small sparking Coil—

184 To a hot saturated solution of NaCl. add AgCl a double salt formed, which crystalizes in cubes, just like salt, these crystals blacken in light, make about 20 kinds with various proportions of AgCl. for X ray — phos & XYZ

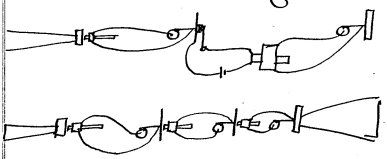
185 Sulphides of metal can as a rule be fused in all proportions with metals, hence here is a new field for more thermo alloys possibly phosphides arsenides tellurides, antimonides nitrides, can be used in this manner.

186. Add Monochloride of Copper to boiling saturated sol of NaCl. in various proportion. & Crystalize for X phos & XYZ.
ditto recently prepr. tungstic acid,
also Oxalate Lithia,

Chl	Cu	all with NaCl.
"	Pb	
"	Pt	
"	Ur	
Nit	Ur	

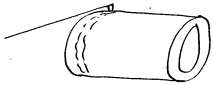
Draft -

187



188 Try one with metals records & hard carbon pencil point bat coil & Bell reader may work —

189

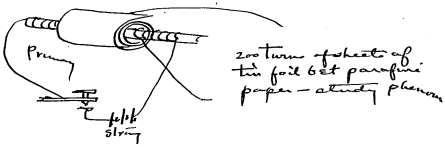


or Lellmann point

Cylinder say of plaster Paris soaked in Nitrate lead telephone & induction Coil Lead deposited on N & radical on mandril reproduce by friction, or current from platina point Cylinder smoothed by Daphne oil & polished after.

190 For coating a cylinder for Chemical recording try glue glycerine & the Chemical to be used Coat Cylinder hot think possibly can turn off with saphire but poly not necessary possibly Gelatine & Varnish of shellac of Soda with Chemo mixed will answer — for Te pens & others possibly Pens S Alcohol + H_2O Varnish will do for Te zt,
Tragacanth, Iceland moss, agar agar Emulsin with the Chemical, gum Arabic Albumen Gelatin, Solution Cellulose in $ClZn$ Mandril dipped in + then in Ethyl, then washed & impregnated with the Chem & Dried see Gwa Solution Amyl collodion then boiled sulphiprate Ammonia to reduce. Reg size moulded Record Cylinder pears soap from hot alcohol This should make a beautiful recording surface if whitened by adding some light precip organic chat or white,

191 -

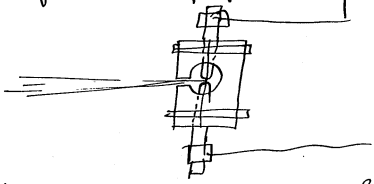


192 Purchase a good Tesla Coil —

metal cylinder a small piece of porous material in opening can try solutions also small crystal for Emg action quickly

193 Get something that makes a constant noise listen to it in quiet room at greatest distance + at shortest distance thro obstacle Then take it into noisy shop + do same thing This will prove if noise helps deaf people or if due to other people raising their voice,

194



to test all fluorescens + etc XYZ of arc light Lime Carbon Chamber - vary he at when testy fluorescens ultra Etc

195 Make good X ray tube only coat platina with Lime glass see what change makes in quality of ray —

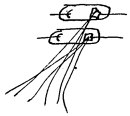
196 Make Aluminium Condenser of thinnest sheet Aluminum obtainable interpose say Mica sheets see if charged when X ray passes or if when chgd Electrically X ray affects or when X pass Condr will affect another X ray tube by discharge

was Al + next sheet Cu - perhaps Condenser would rectify -

197 See if one X ray bulb having it plates cupped & focused through the air to an adjoining X ray ~~tube~~ platinum with flat sheet, Vary this Experiment so the spot where it strikes glass is arranged so ray will go across air to another bulb —

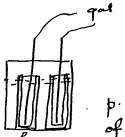
198 See what one X ray bulb does to another both active

199 See if rays of one bulb is increased in power of penetrating by adding a second bulb so its rays are added to the first



200 Cellulo'd cell with oil + X ray tube in -

201

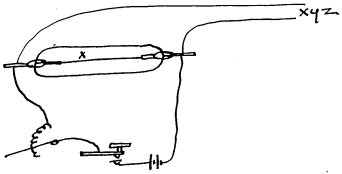


p. porous cups one with crystals of an acid other with crystals of an alkali also one with Soda + other with very quick dissolving crystals Soda in outside solution Idea being that going from Crystalline form to liquid form will give or absorb Energy try those crystals that give Cold on dissolving in one cup and heat on dissolving in other cup also a neutral Crystal giving neither heat or cold against those giving both h + cold

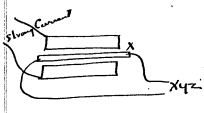
202 Fused Electrolyte Thermo Experiment.

Copper & Iron, in iron crucible — use Chalk ZnCl + def Chlorides, bromides, Key alkaline salts Borates phos Also Nickel Crucible Ag Crucible, fusible glass, enamels etc see Voltage + of Electrodes attached,

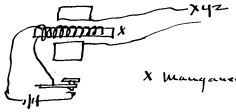
203



X non wire in Vacuum, brot up to recalescence point + then raised and lowered see if molecular wave brought out, Vary —

204 

X manganese steel are of molecular waves sent out,

205 

X Manganese steel + other metals,

Becquerels order of power of Phosphorescence
1st Sulphides Ba + Ca par excellence —
2 Yellow diamonds. 3rd most specimens fluorspar
206 4 Arragonite. 5 Calcerous concretion, 6 chalk
7 Apatite, 8 Heavy spar — 9 Dried nitrate Calcium
10 Chloride Calcium dried, 11 Caly a large
number of Barium Compounds, Magnesium + its
Comb, also large number Organic, Dry paper
Silk, Cane sugar Milk do, amber leath,

207 New — Take X ray bulb exhaust till no X ray
vac being too high, now focus on it rays
from an active X ray tube adjacent,
this should break down the resistance +
should get X ray in 1st tube, then continue
Exhausting + perhaps can reach another
ray this can be carried further perhap
by more powerful Exciting tube or
several of them massed — If dont go
try Ultra light from Arc through quartz crystal
fused in tube,

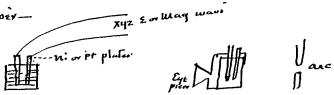
Also try bring it back by putting bulb in strong mag field also in CO_2 snow.

208 Make following X Ray bulbs with platina vane but cup Mag Of Zn Fe Ni Pb Sb Bi Cu Ag Co magnetite NiS FeS Grafite see any phenomenon. possibly with Co Fe or Ni Cup magnet might deflect ray –

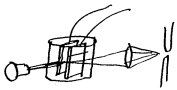
209– Place a NiFe storage or Elefande battery in field of mag see if C or Voltage affected, Try right-angle + parallell to Lines, Doubt affect NiFe storage Battery

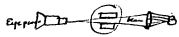
210 Air least least 1.00 + mica the most 5.00 Spec Induct Capacity possibly this is due to layers if so an artificial thing could be made possibly of enormous Capacity say dip foil 1st in Room in Ethyl then Hgll in Ether or ferric Cl. use solvent for one that does not affect the other It must be a question of layers + contact or discontinuity that makes mica so high + not to its Chemical nature hence there is a field here for investigation + the production of layers Extraordinily thin of materials having not contact as with mica, all that is required is dif solvents + material like water + a hydrocarbon. possibly there might be found a materials or materials that would be less than air

211 XYZ Receiver—



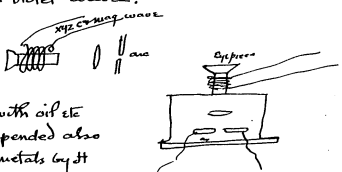
oil in which extremely fine crystals which float in the liquid When waves comes particles set themselves parallell or in such a way as to affect the light coming through – the opalescence is changed.





Even conducting liquids could be used Ni Fe grids + KOH, or Cu $CuSO_4$ Cu or Zn KOH Zn or Zn $ZnCl_2$ Zn Zn $ZnSO_4$ Zn Cd $CdSO_4$ Cd.
Crystals can be ground impalpable but preferably microscopic ones unbroken used possibly Hydrosols various organic liquids might be used.
This will be fruitful source of phenomenon. powdered magnetite or precipitd magnetic oxide Metals reduced by H suspended in gelatin or Hydrosols possibly cell should have quartz entrance + Exit for beam to get ultra violet waves.

211

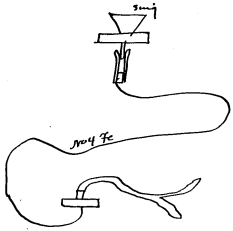


Tube filled with oil etc powders suspended also mag oxide metals by H waves cause particles arrange themselves + change the opalescence possibly better than Branly for Marconi + fine for XYZ.

212 The sound produced in Fe by magnetism is very much stronger if a wire is used + a current is passed Use powerful Current + several feet of wire + attach to XYZ Recorr use metallic ckts

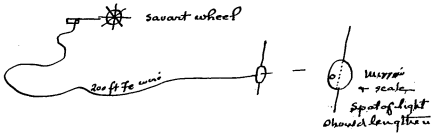
213 According to Mitthersen Cobalt is next to Bi as a thermo this combined with best alloy gives more voltage Co can be got cheap it shows there is a good field in high Melting Pt alloys
Fe is 179 against Sb 9.8

214



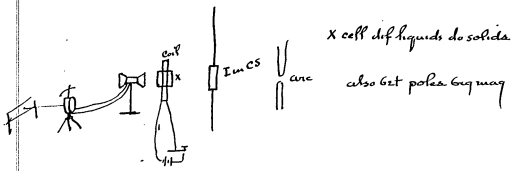
See how far can go

215 Guyot, Guthrie + Schellbach observed phenom of attraction + repulsion existed on suspended particles by bodies vibrating in proximity they say nothing is known as to cause.



216 Iodine in CS_2 is impervious to all visible rays from an arc light but pervious to radiant heat, only a very slight absorption taking place. This is ideal for trying the slides with fluorescent crystals for fluorescence + photography also for speed photo plates sensitive to radiant heat. for monochromatic heat rays which might perform work when plain arc lamp would not, also for low temp radiation like from Sulphur phos, Hot Zr Lamp fil 32 CP at dif temps, could arrange it in dark room the thin cell of I in CS_2 being the window + rare the outside,
Melloni used a Thermo pile + got advancing result of heat absorption possibly ray might be absorbed or altered by the character of the metal of the thermo, don't get caught. look out about the material of the jar for I in CS.

217



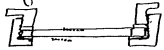
test of powerful moving lines of force will alter the nature of a liquid or a solid through which invisible radiant heat passes so as to affect thermo pile
make 20 Element pile new Geot alloy + Kelvin mirror q.
also Telephone in secondary + pile in primary —

218 Radiometer with Vanes of platinum also $CaWO_4$ on glass + then subject to X ray —

219 Is it possible to fuse a large crystal to a solid keeping its form although it originally had water of crystalization such crystal would be good for Export,

220 Is fused NaCl as a plate as good as a solid plate of rock salt,

221 Make some cells of Celluloid Mica glass gelatin etc that form would be circular like telephone top.



222 New Idea. Grids & cups of rubber, celluloid etc mixtures various materials with graft to flake pressed in cake with graft pencil to make contact and acid radical solutions etc

223 Infusible stearates of metals made into blocks by great hydraulic pressure ought to be valuable also mixed with powders & heated & hydraulicked may give some very useful compounds. Neutral Oleates Resinates would be cheap —

224 Perhaps large crystals Tungstate Na put in Vac & gently heated till most H_2O comes off then packed in charcoal or graft & heated to consolidate try other crystals may lead to something.

225 Possibly Carbonization of crystals like Sulphanilic acid Urica etc which decomp without melting might if heat to are Temp in absence of conditions which give graphite produce Carbonado, enclosed are, Collect from Watts substances that DWM. I have them all marked,

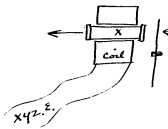
226 Remember the very elastic filements like rubber made by high temp linseed oil on fib of Bamboo, reproduce conditions + see if the Resin in Bamboo or Cellulose that produces the result, then expand to make flexible wood, paper, etc as substitute for Celluloid Rubber Etc this would be a valuable material Could not reproduce results

227 Mix hydrated Mn_2O_3 – or MnO_2 H_2O, PbO_2 OH with gelatin pour in sheets + heat The O reduced would Ox the gelatin + make it insol in H_2O + if flexible would be valuable, try BaO_2 CuO hydrate. Ferric Chl.

228 Tetrametaphosphate of Lead fluoresces slightly to X ray see if it fuses to a glass.

229. Try phono diaphm with small hole in it to permit a relief to the Condensing wave possibly 200 mesh screen with or without holes closed more, might change quality to the better, perforated disc with 10 or 20 1/8 holes in it but film of Collodion closing holes but excessively thin film

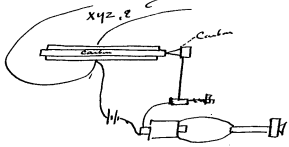
230



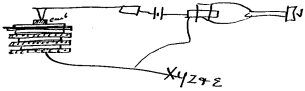
X cell with rock salt or other
Ultra non absorbs filled with
diff liquids also transparent
etix solids.

Theory being that bodies which absorb light or heat waves transform it into other forms of energy with diff wave motion or rate of vibration which may make local moving lines of force cut the coil X Revolving shutter causes intermittency

231

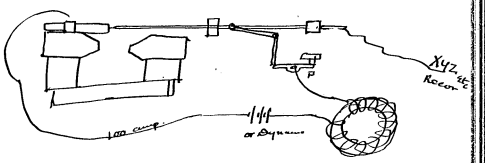


Theory that there is longitudinal Vibration



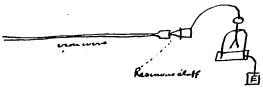
Layers of metals + thin insulating films
Capped by telephone Carbon or the Bauds style
with powder

232



A spark broken right in concentrated field to give pistol shot shot break. This explosion to traverse the iron & effect X42 etc receivers. Idea being to transmit high frequency sound waves in iron wire in water 100 or more miles. Leyden or Coil with balls of iron + wire used.
perhaps a sound resonator with molecular iron can be obtained this certainly should give a million a second sound waves. Wave length $\frac{1}{10}$" inch —
This frequency of sound wave on wires should cause attraction & repulsion strongly of light matter, perhaps at extreme end of iron will get attraction by electrification of air at surface this would make Brauley work

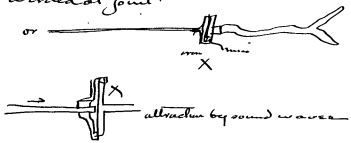
Receiver end of wire



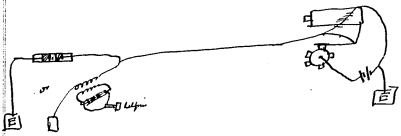
Phone

If vibrations of sound through a wire is 1 million sec the wave length will be 1/16" long a Brauly with wire extending into tube & faced with Ag the other plunger can be adjustable when 1/32 or 1/16 should set air in vibration & agitate powder which can be continuously electrified the vibration breaking ckt.

Can tune by moving ~~plunge~~ plunger. Iron wire should be welded at joint.



233 From the way phonoplex works in wet weather with wires on ground, it is possible that a bare wire 100 miles in water might transmit a millionth per second waves recog on a Brandy using discharge of big primary broken by air blast or magnet.



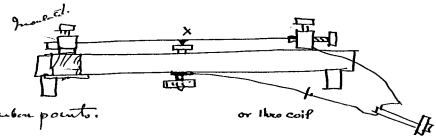
234 Didymium may be a good oxidizer in battery gives a perox which gives off O in acids or by heat,

235 In forming crystals, their form changes according to solvent from which they are crystalized, for instance $NaClO_3$ may crystlz entirely dif from KOH also fluoresces from dif solvents,

240 Make a few slides of X ray and Arc light fluorescen from solutions with a salt of the same "ion" also along solutions not crystalizable + not incompatable, and crystz at dif temperatures as there is marked dif at dif temps

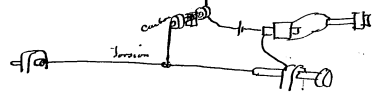
241 Sublimed Mercuric Iodide gives yellow crysts which slightest touch turns scarlet + extend throughout mass when crysts are touching or with a slight motion, This might be used as indicator for sound on iron wire or XYZ — also it might turn scarlet then yellow + back by certain forms of stress waves. Its a different form of crystaline structure that causes the change of color, hence being on the verge of change small energies should work it.

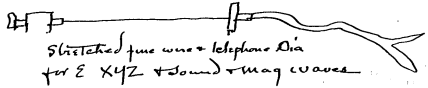
242 In forming large crystals large flat dishes should be used + possibly paraffined to prevent creeping



243 x Carbon points.

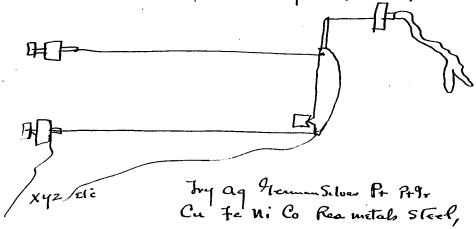
Stretched wires to detect XYZ + sound waves





Stretched fine wire + telephone Dia for E XYZ + sound + mag waves

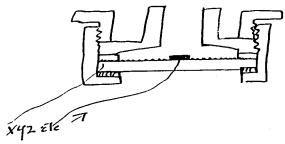
244 Wertheim says coeff of elasticity varied by Elec Current independent of the heat caused by its passage.



Try Ag German Silver Pt Pt-Ir
Cu Fe Ni Co Rea metals Steel,

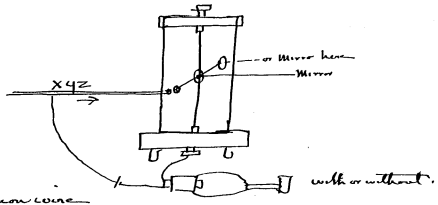
245 for recog sound waves over iron wire make telephone receiver with adjustable air chamber adjustable by screw from .005 to 1 inch to get resonance. A Brauly fastened to Dia might give results of constantly Electrified + Telfone Coil + bat used.

246



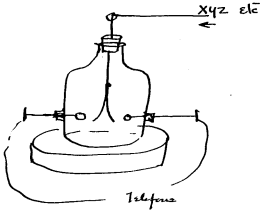
Telephone adjustable with mica diaphm + a glass dia heavily smoked over with lampblack from a pointed wick of Kero lamp and connected around edges + center. The passage of wave of E XYZ across lampblk heats the air + if there is a break tuning fork giving say 200 per second for each dot formed of waves millionth second it will give

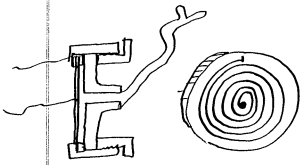
Sound for instance a dot lasts 1/4 second formed of waves going at rate 1000 000 sec the wheel throws intervals 200 sec



Torsion wire
Try diff metal —

247





Disk of porous pot or Lithgh or oil alone painted over with solute opual of graphite to make high Res — Then put in Telephone Receiver chamber

Passage XYZ Etc Exposures air —

248 Possibly fused Iodides can be made to mix with thermo alloys of light spec grav. Thus might make fine alloy also with Sulfides Selenides, Tellurides, Arsenides, Phosphides Nitrides

249 Organic liquid battery
Copper poles in organic liquid non conducting with an organic salt of Copper dissolved see if Can plate with Current, also other metals

250 It may be possible to make a storage battery with organic liquids. The Zn salt of an organic acid sol in the liquid + an oxygen strong salt say an organic acid Manganese salt & Pb. It wld have great Res but plates could be large numerous + very close together - say .003 made like a Condenser. Res might be got low enough - No local action on Zn EE as solvent not decomposable by Zn.

251 Quinone has greatest power to crystalize of almost any known substance. If even small quantities are sublimed crysts an inch long are obtained, This means something abnormal. Its so volatile that at Even ord Temp it sublimes from one side of the vessel to the other also crystlze from H_2O has strong odor irritates the eyes. Its a strong oxydz agt In alkali absorbs O from the air turns dark obtained by ox of Quinic acid - Can be detected

one part in a million by Hydrocaeroliquone why not soak paper in Quinic acid + Hydroc + then with platina point oxidize by current for chem Telgh
Its a peroxide use in battery S says its a powerful oxdzr like peroxides generally
Quinhydrone is another abnormal subslance (Schorlemer see) Green hydroquinone forms the most beautiful subslance which organic chemistry has yet produced crystals bear a resemblance to the feathers of humming birds when cryst on white porcelain presents a most beautiful appearance.

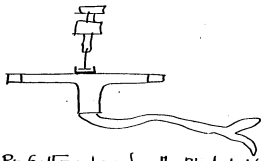
252 Hydroxy quinonoxime or Mononitroresorcinol
Decomposes without melting

253 Azoresorufin test for alkali Sensitive for Chem recording

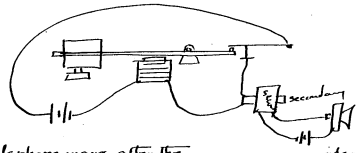
254 Resorcinol blue, discolored by Zn dust, very sensitive
Use with Pt point H pole Chem Telgh.

255 Pyrogallol in water turned brown by nitrous acid
use nitrite K + platina pen O side as K gives black
this with parallell pens gives continuous mark.

256



Cup with Pt bottom faced with Pt disk 1/4 dia + fitting fairly close to celluloid or ivory of cup in the cup put non conds oils etc for XYZ. & Sound if non conds do not work try Cu disks + Blue vit also Cu + Pd also KOH to make gas if for gas use ivory disk + .001 pt point center ivory + flush to increase density



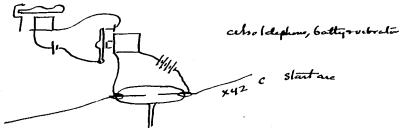
also XYZ

257 Telephone waves after the quality of the fork sound
by modifying arc at points use 10 cells + wind mag to out to get long arc at points, Ultra from arc should alter tone when striking arcing points.

258 Organic liquid Storage bat, Try as base benzol and req grids with Grafite + OX giving substances + other grid with an oxdzble material Pyrogallic A Hydroxylamine + such like insol in Benzol.
after trying a large number change base liquid from Benzol to Pyridin + so on.

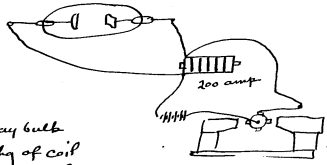
259 I think O or OH might pass across a non conducting liquid even charing the other electrode + which being continuously charged and discharged give a current. by millions of static stress charges without any current passing thro the liquid at all. persistence in exploiting will surely turn up something startling in this direction plating Zn on Magnesium films in KOH proves that static stresses can give current if frequency is great (10) a Dielectric can be stressed + destroyed millions of times a second by chemical reactions within the dielectric.

260



small Vac lamp actual size, exhausted for best point for spark — wires .001 apart also use in dark box alone + notice light, Various changes running on it test with Etheric 1st —

261



Req X ray bulb
try discharge of coil
by break wheels air
also in Magnetic field possibly get stronger result than with any induction coil —

262 Organic Storage Bat

Its likely that with Ni_2O_3 + Fe grid in an organic hydroxyl compound dissolved in an organic liquid that OH will be transferable.

261 Get all the cornel aniline color salts with structural formula see Allen Roscoe + S. these salts can be easily manipulated to make many compounds for organic XYZ + storage

262 Amido-Azobenzine easily O + Reded to a weak mono acid & salts decomp by H_2O.

263 Chem Telgh— Helianthin Tropaeolin D. Orange III Dimethylamido-azobenzene changed from yellow to red by acids used instead of Litmus (Ammonium salt) Phenylamido-azobenzene-sulphonic acid K salt. acid colors red also used for titration

264 Chrysoïden dis in dilute shellac used by photgrs paint windows dark room. see Roscoe + S Vol 3 310

265 Conc Sulphuric a non condr dissolves lots organic substances, dis Aniline black forming Sulphonic acid salt Easily Ox + Reded. Batty. Indophenols Easy Ox + Reded. ditto Trichlorophenol blue Lauths white, Leucothionine Ox extreme rapid in air Methylene White + Blue Ox + Reded easy

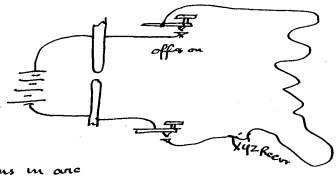
266 Try experiment with a thermo pile that when iron is magnetized its temp falls same as when junctions of thermo has C passed its gal. cold

267 Curious remark in Ganot. Whenever the effects of Electricity are reversed heat is produced Whenever the effects ordinarily produced by heat are otherwise produced cold is the result !

268 Obtain large piece Scheelite cut out a prism have a slit like a spectroscope + guard all around slit with lead have it in dark box use telescope as with spectro see nature of spectrum if widens + try X ray liquid absorbers etc

269 See if Oxalate Lithium can be fused under pressure + if so if it fluoresces by arc light if so make a prism also try in reg spectroscope with quartz prism in the ultra see what part Oxlate Li fluoresces in —

270

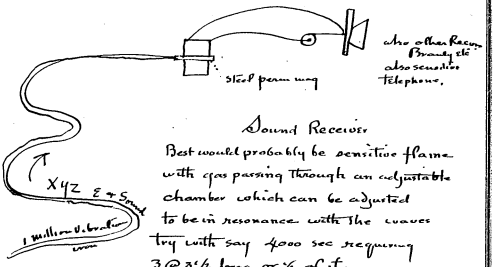


Vibrations in arc
sending waves analogous to sound

271 Improvement in Telephone Induction coils.

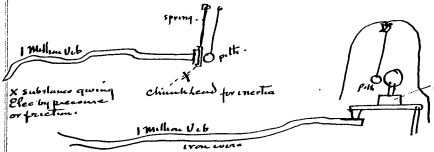
Secondary wound with flat ribbon To act like a Condenser made very thin + then foil (tin) it will be sharper.

272



Sound Receiver

Best would probably be sensitive flame with gas passing through an adjustable chamber which can be adjusted to be in resonance with the waves try with say 4000 sec requiring 3 @ 3 1/2 long or 1/4 of ft.



Sound waves impinging on crystal gives pressure etc.

273

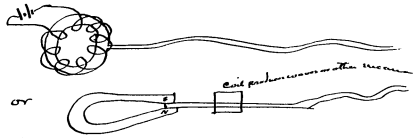
no coil.

1000 V dynamo Telephone powder coalesces by volts + sound-waves decohers no coil of to 6 loud dif powders

274 CuS should alloy with every other metal, also FeS CoS NiS etc giving an unlimited number of thermo alloys.

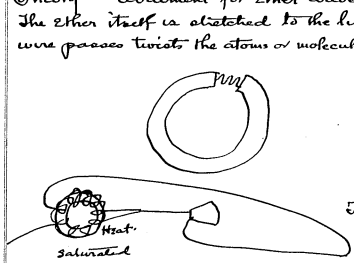
275 Acetylene gas might be good for sensitive flame.

276 Transmission of sound waves over iron wires may want an abutment?



Theory abutment for ether waves
The ether itself is stretched to the limit when Cu wire passes twists the atoms or molecules

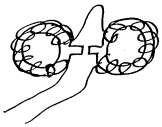
277

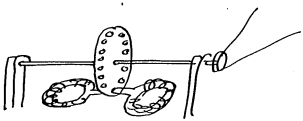


Thermo abutment tiny

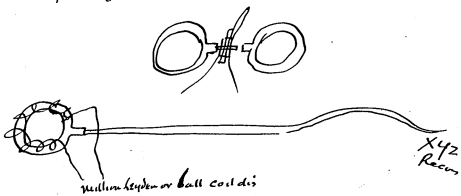
278 If Becquerels theory is right that thermo etc due to unequal heat conduction of a circuit then Cu + one of those Manganese alloys used for Res ought to be good.

279 Clammounds Thermo gives 6 watt hours for 3 Cubic ft of gas or 2 Watt hours per cubic ft gas
375 c ft per hph gas at 70 c at Orange 25 c hour
if no depen this wold do for charging our Storage Bats

280 
Etheric abutment.

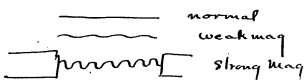
281 

Try whirling crystals attached to a disk
Especially several fluorescers (Thos) through the abutment gap Try whirling Coil etc
also for X y z etc



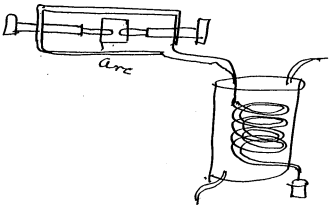
282 Theory

When an electromagnet is made by current the molecules or molecular crystals set themselves parallel + in lines at right angles to the wire they butt on each other, in so doing the Ether lines which between the poles at air gap instead of being straight are now bent just as in a vibration of light, the stronger the magnetism the great the bow of the Ether wave



A Copper wire loop passing through the Ether waves when straight + normal offers no resistance because the line has great elasticity, hence no C but if Ether lines is bent in waves near to limits of elasticity then it offers resistance. When the Cu loop is open there is no abutment + passing the loop through the molecules of Copper are seperated by the Ether lines + no work done but when the Cu loop is closed the molecules abutt on each other + as the Ether is near its limit of amplitude it requires work to force it through The distending or disturbance of the Cu abutments as each ether line passes of which there are millions in a inimeter causes a wave to pass + this is given off as heat If this wave or movement of molecules is transferred to other places it gives off heat there What gives direction is that the abutments are either closer at one end of magnet than the other This point should be wkd out more direction is the differently

283



Air free CO_2 + O. Lime + Carbon with arc
forms Ethylamine Condense + absorb
by an acid Make Ethyl alcohol.

284 Stearate of alumina swells enormously in Benzol if slightly heated probably one lb stearate of make 100 lbs Benzol jelly its like the ether of space Try Experiment

pour Benzol on top see if it runs out pure benzol on bottom thro sieve 200 mesh at any particular point.

Photography — X Ray XYZ

Iodide Hexyl — acted on by light
Mecurous Iodide exposed to light turns yellow then red
Calomel becomes dark grey when exposed L
Mecurroso-Mecuric Iodide Sensitive to L
Mecurous Oxide decomp in weak L even decomp by pressure
Mecuric Ox gradually blackens in sunshine
Tetramecurammonium Carbonate turns grey when Expsd to L.
Mecuric Iodallylide changes color when Expsd to L
Mecuric Iodethide easily Decompd by diffused daylight.
Phosphate of Methyl turns grey in L Watts 3rd 993

Possibly Syrian Asphalt on glass in Chlorine would be acted on by light. also film chromic acid which oxdzd becomes Insol also Gelatin surface in Chlorine also Gelatin with N_2O_3 put on surface + Expsd also Na peroxide Cathypo Napermang Co_2O_3 etc Acetylene Ether pure or mixed with other gases sometimes detonates with Chlorine even in diffused daylight if Ether is in excess, products are HCl + Carbon

Bromine even on foggy day unites with acetylene after a time explosion occurs.

Allylene is acted upon by Br in the shade

Allylene di-Iodide turns brown in light
Iodallylene C_3H_3I Cryst inch long very
sensitive to light 1st Sup Watts 97 + 98

Benzylene Bromide is an oil changes color Expsd L

Orthotolyl Mercury salt crystals decomp by L
ditto Pb salt,

Nitrobromoxylene (Benzine) turns red expd to L
1st Sup 294 watts

Diamidomesitylene turns red Expsd L Cryst,
1st Sup Watts 300

Anthranilic acid or Amidosalylic acid
Pb salt turns yellow Expsd Light,

Paranitrobenzyl Alcohol. Cryst turn yellow in L

Several double Iodides of Bismuth (1st Sup 348)
are quickly altered by L especially in what L
surfaces alters Bi Iodide also.

Solution Bleaching powder or CP HypoCa
gives off O in light.

Chrysogen Solution quickly becomes colorless in L
1st Sup 459.

Acid Potassium Vanadate in contact with organic
matter turns blue in light 3rd Sup 12.33

Oxalate Hg Sensitive to light + Radium emanations

Phosphenyl Di Bromide Liquid turns yellow in light & decomposes depositing a red substance.

Benzyl di-selenide Crystals exposed to sunshine turns from yellow to red

Ammonium Benzyl Selenate (White Cryst turn black exposed L.

Conine Hydrobromide turns red Exposed L

Tetranitrodinaphthylmethane liquid turns yellow Exposed L

Dioxy thymyl 2 thtylene Cryst Easily altered by L

Bromine in sunlight presence H_2O oxidizes many organic compounds (neutral) to acids such as Benzol. Toluene Mannite Sugar Glycerine.

Thallium Chl sensitive to Light

As mediums for films. on glass for holding substances acted on by light.
Albumen — Agar Agar — Gelatin — Collodion Paraffine — Damman Varnish Rosin in Ethyl rather resins Alumina trihydrates Gelatinous silica, Na Silicate Dextrin Tragacanth Starch gluten Balsam fir Gutta Percha Rubber Balata Mastic Varnish Amyl Collodion Reg Collodion Molasses & glue, Cellulose from Zn Chl Shellac Varnish Iceland moss Fish glue Ferricyanide Cu — Slippery Elm, Gluten,

Plates of all the inorganic acid salts containing different metals with Ag such as Tungstate Chromate Etc

Cuprous Chloride very sensitive to light
1st sup 493 3rd sup 566

Tungstic acid in presence organic matter reduced to blue oxide by Light.

Iodoform dissolved in CS is excessively sensitive to Light colored violet owing to liberation Iodine

Uranyl salts highly sensitive to Light

Gold Trihydroxide decomposes + gives off O Exposed to L

Aurous Cyanide must be made + washed in the dark very sensitive to Light,

Chlor-auric acid Sensitive to light.

Note Possibly Iodide Nitrogen in gelatin etc on plates might be decomp by different rays Ultra red for instance so could photo in dark X XYZ etc

Formate Ag decomposes when moist even in the dark Formate of Hg does the same
How about Au & Pt Ir etc Crystals formate Hg decomposes by pressure possibly radiant heat decomposes in dark—

Potassio-Mercuric Oxalate sensitive to Light & heat. also Ammonio-Mercuric oxalate.

Diazonitrophenol yellow powder turns red Exposed L also Diazonitrochlorophenol.

Platinochloride of Diazobenzidine Cryst when drying turn brown when Exposed L

Hydrobromate of Azophenylamine Explodes violently by heat, friction or pressure

Nitrate of Azophenylamine Explodes with terrible violence exceeding fulminate of Hg or Iodide Nitrogen Explodes at 100 C. friction or pressures.

Azobromophenylamine is a very dangerous compound, the slightest pressure or contact with a rough substance causes it to go off with fiery Explosion Exceeding Azophenylamine

Chloroplatinate of ~~Cl~~ a Chloroanilin cryst turn violet Exposed L

Ethylanilin Decomp by L

Ethylidene-diphenyl-diamine Cryst gradually turn red Exposed L

Calcium salt Nitrocuminic Acid gets darker when Ex to L

Ferrocyanide K Solid + Liquid slowly decomps to Prussian Blue by L

Ferridcyanide K very easily by L

Nitroferricyanide K Changed by L

Nitroferridcyanide Na more sensitive to L giving Prussian Blue

Dry HgCy in Chlorine gas decomp by L

Evidently there are numerous substances that can be put on glass or metal plates within a cell with Chlorine gas & photos taken in Camera also X & XYZ

Cyclamin turns brown exposed L
Solution in sealed tube Exposed L deposits white solid —

Digitalic acid affected by light

Many organic substances prone to oxidation at slightly raised temps in the dark not oxdzd but when at same temp are Exposed L are rapidly oxdzd Especially Indigo blue Tumeric, Color of flowers bleached.

Ericinone Cryst Effected by L

Iodide Ethyl colorless if flowed on Hg & Expsd ☾ decomposes to red iodide Hg formed liberating Ethyl other metals than Hg does it this is good substance to experiment with.

Monochloronated Chloride of Ethyl, Chlorine dissolves in it abundantly & there is no action in the dark. expsd ☾ violent reaction, torrents HCl, Evidently ☾ has some connection with Chlorine, in Chl aq in req photghy.

Chloride Au in Ether deposits gold expsd ☾

Ethylene Dichloride of Platinum (solid) becomes brown or black Expsd ☾

Fulminating Ag blackens Expsd ☾

Furfurol turns brown + some even in dark

Gallotanic Acid acquires yellow color Expsd ☾

Trichloride Au decomp'd quickly Expsd ☾

Auric oxide reduced by ☾

Guaicum changed Expsd ☾ especially Violet ☾

Acid Chromate of Quinine rapidly d when Ex to ☾

Racemate Hg colors on Ex to ☾

Hydrocyan—Rosaniline colorless turns red Ex to L

Rosolic acid Rosolates easily d by Ex to L losing colors.

Ruthinic tetraoxide sol H_2O rapidly D Ex to L

Santonin turns yellow Ex to L.
Dichlorosantonin ditto

Ammonio-Mercuric Sulphite decomp to Hg globules by L it even decomp in dark in sealed tubes.

Metanaphthylsulphurous acid Pb salt turns brown Ex to L

Chloride Thallium Dec by L

Thymol product oxdtn Thymol. D by L

Thymol in Chlorine gas sensitive to L

A certain protox of Sn blackens in L

Acetate Ethyl in Chlorine in Sun Explodes

Aqueous sol Citric a in Chlorine in Light changed to Hexachloroacetone

Iodide of Acetyl in presence Hg D by L

Iodide Mercurallyl turns yellow in ℓ

Sulphurous—Iodotrimethide (p 885 Last Vol) Crystl quickly browned Ex ℓ.

Mercurous Benzoate turns yellow Ex ℓ

Cocothelene product action Nitric on Brucine browned in ℓ Vol 1 700

Sulphide Allyl precips Hg turns black in ℓ Watts Vol 1 1144

Arsenate Cu & NH_3 dd by ℓ Vol 1 381
ditto Arsenate Cu —

Dimercurous Arsenate changes color by heat
do Sulphantimonite Stibiethyl powder.

Chlorine in foggy weather acts on Acetic acid to form Monochloroacetic A.

Solution acid Chromate K mixed with NH_4 or Ethyl deposits brown sediment in light not in dark—

Phosgene gas action Cl on CO in ℓ forms Chlorocarbonic acid—

Chemicals Electric by friction

Oxalate Calcium "

Bebirine " amorph powder

Bucunimanga Resin "

~~Ch~~ Cinchonidine " pure white powder

Disacryl, powder, " Strongly

Elemi Resin shines in the dark when rubbed
Dry Radium

Glycosine strongly Electrified by trituration,

Hydrosalicylamide Lead salt highly Elec by friction
Dry radium

Myristone Elec by friction Dry Radium

above from Vols 1 2 & 3 Watts
enter balance,

Lead tetraphenyl J Chem S 54 1888 283
see Polis (Ber 20 3331 3336 Chem S Jnl 1887 572

Dichroïns compounds having fluorescent + dichroic qualities see Brunner + P Chuit Ber 21 249 256 Chem Soc Jnl 54 1888 p 363 also Kramer + Brunner C S Jnl 1884 1354 do Lieberman C S Jnl 1874 693.

Phosphorescent Blende A Verneuil C Rendus 106 1104 1107 do 107 101-104 Chem S J 1888 1248

Action ZnCy on Metallic Chlorides by R Varet C Rendus 106 1080-83 also C S Jnl 1888 54 799 780 good—

For dissolving Cellulose Acetone-Chloroform C.S.Jnl 1888 810 also Jr Pr Chem [2] 37 361 374

Action Pyridin on Metallic salts C S Jnl 1888 54 850 good—

Emf ferrocyanides Espcly FeCy + FeCuCy

Uranates of Ethyl Methyl etc Ammonia C S J 1888 918

Acetylene best absorbed by 95% Ethyl alc Sol Ag Nitrate if in excess dis precip all hydrocarbon compounds of acetylene series form compounds mostly Cryst C S J 1888 930

Na or K Tungstate equal molecular proportions forms salts with Tartaric a. C S J 1888 938

Anilin Combns cuprous Chl C S J 1888 1000

Action alkaline phosphates on alkali Earths fusion good C S J 1888 1033.

Double phosphates Magnesium group fusion good C S Jul 1888 1035

Benzene derivatives of high molecular weight Pentadecylparatolylketone etc. Kraft. Ber 21 2265 2271 C S J 1888 1087 do 1887 252

Dichroïns C S J 1888 1182–83.

Chl Zn combines with amines + basic organic substances picolin Etc Nitrates sometimes Cryst from alcohol. C S J 1888 1281

Dichroic cryst C S J 1880 41 105 106. + 644

Phosphorescence in Vacuo Pt Cy Key Etc C S J 1880 204

Diphenyl salts C S J 1880 476–7

Uranium oxyfluo compounds with fluorides of alkali metals C S J 1880 794 853 also A Ditte C Rendus 91 166 168 do 91 115 being fluorescent compounds of Uranium

Double salts Propionic acid C S J 1880 799

X Ray fluorescence

Benzoate Ammonium
Salicylic " "
Ba Fluoride
Tungstate Ba fusion
Ba SulfoBenzoic
Tungstate Beryllium ; precip. fluoresc.
should make some by fusion.
Cd Sulfate Bromide Chloride Iodide.
Cd Oxide $CdWO_3$ not so good as $CaWO_3$
Cd Bromate.
Calcium. Formate. Nitrate Salicylic
Sulphurosum Fluoride Iodide phos
Pectolite (Silicate Ca)
Soda Lime

Calcium Carbide fluoresces when directly exposed to the electric arc
$CaMo_3$ $CaWO_3$
$CuWO_3$ —

Iron Acetate, Dialysed

Lithium, Bromide Benzoate

Oxalate of Lithium powerful fluorescer when exposed directly to the Electric arc, ie Ultra (+ Phosphorescence and long lived) Could not Dup
Try again might be impurity in arc Carb try different
Lithium Bichromate Electrofluorescer 2" away

X Ray fluorescers

Lead Tannate Sulphate Iodide
Tetrametaphosphate Bromide
Chloride Carbonate.

Molybdic acid.

Mercury Bromide phenylate Subchloride
Mercurous Chl Mercuric Chl

Potassium Iodide Bromide Silicate.
Salicylate,

Silver Carbonate Chloride

Sodium Cresolinic Salicylate fluoride
Bromide Carb Chloride Tungstate.

Plumbate Soda. Electrofluorescas 3" away
ditto Iodate Na very strong " "

Strontium Salicylate Acetate Tungstate
Chl Tungstate fused Molybdate,

Sulfide Strontia quite strong fluorescence
direct arc light fused may be better
too Opaque for good X fluorescing

Uranium Acetate Phos Nitrate Sulfate

Zinc Tungstate Phos Acetate Chl Carb fused Molybd
(Hypophosphate Electroflus 3" away), Tungstate,
not so good as $CaWO_3$

Ferrocyanide of Zinc powder conducts
a spark jumps thro the box curious!

X Ray fluorescers

Miscellaneous

Gold + Key — good
Zirconium + K fluoride good.
Mercury Oxycyanide.
Caesium Rubidium + Ammonium Bromide
Bi + Ce Salicylate
Bi Sub Benzoate
Na + K Carbonate
Li + Benzo salicylate
Li Benzoate
Acid Sulfosalicylic

Ore specimens

Monozite sand some pieces very good ?
Calcite. Fluorite Rock Salt. Zircon Hyacinth
(Danburite. Borosilicate Ca)
Orthoclase Andalusite (Si Al + K)
Pectolite (Si of Ca) Pyromorphite (Phos chl Pb)
Apatite. Herderite. (Phos Al Phos + fl ca)
Wulfenite (Mo Pb) Scheelite.

Crystals made by myself fusion in Salt,

No 1	$BaMoO_3$	
No 2	$ZnWO_3$	fluorescer
3	$CdWO_3$	fluorescer
4	$ZnMoO_3$	very slight
5	$CdMoO_3$	~~fluorescer~~.
6	$BaMoO_3$	fluorescer
7	$SrMoO_3$	fluorescer

No 2 has apoto that fluor better than scheelite
7 + 3 have good apoto but No 2 very brilliant.
4 5 + 6 no new lot. No 3 3/4 as good as $CaWO_3$
No 2 only 1/2 as good as before
probably made wrong ?

Best X ray fluorescers are

1st Pt Ba Cy
2 Calcium Tungstate.
3rd Cu K cy
4 Sr WO_3
5 Hg Diphenyl.
6 Salicylate Ammonia.
5 " Strontia

Possibly Zn WO_3 Can be made to be better than Ca WO_3

following undetermined

Subchl Pb ~~Hg~~ Iodide Cd Ur Nit KBr tetramelaphos Pb KI fluorspar PbBr PbSO4

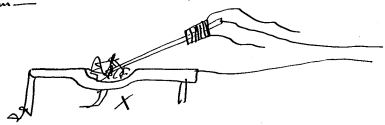
with smaller coil - 5 to 600 blks sec best is Pt Ba Cy Ca WO_3 Cu Key ^ Hg Diphenyl Salicylate Sr acetate Ur -
Hg Diphenyl gives no phos like Ca WO_3 !

Jany 22 1903.

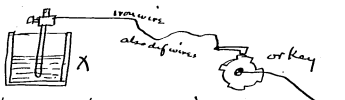
Try and photograph the spitting sparks from different metals by closing a circuit with big condensers across surface Each metal gives a specific spark also try sparks due to abrasion with Emery wheel? Try powders reduced by Hydrogen known in flames generally investigate this subject that every metal should give a different shaped sparklet is certainly strange Try alloys - see if 2 or 3 metals in alloy can be detected by scintillations, Did this Prof Holland has records, interesting

Investigate the smell of Tin, see if its a vapor or a field of stress affecting the nose,
Test the variation of friction when a metal is rubbed over paper etc resting on Tin

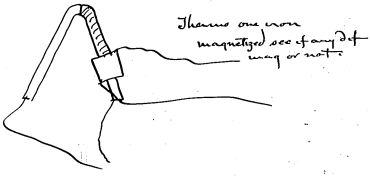
Run down the Argillaceous smell of alumina.
Clay etc, all clays smell also precipitated alumina — loses smell by heating. What is this smell — an element gas or an influence or Opaque Radium, or adsorferous Radium —

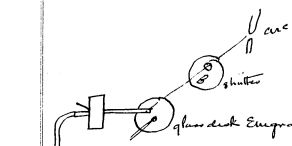


X Blacksmith forge Anthracite or Coke, Iron rod see if any thermo current ditto when rod magnetized,
also —
Heat one end rod red hot then suddenly plunge in water & Connect helix to Galvanometer see if kick at moment of cooling — ditto try XYZ — Receivers —



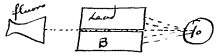
X cell filled with acid or other liquids attacking metal. theory being chemical reactions sends molecular waves through wire
Can use iron wire & rod of different metals in the cell —





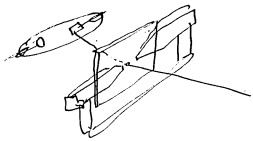
platina or other points acc of beam light allows
Coefficient of friction, ditto X ray Lead shutter,
besides glass use other transparent materials
Rock salt Celluloid Gelatin, transparent
Agl Mica

Try small cylinder of Pears soap in Malograph



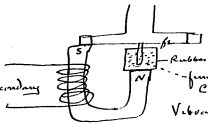
B is cylinder of lead - ~~little~~ with 10/1000 hole thro the
Center or less, B is 3 inches long. X ray beam
passes through hole, use magnet, Coil on outside
also heat B acc of ray can be affected,

Possibly some of the many fluorescence
I have found do not fluoresce to the real X
ray but to other rays possibly a screen
that would cut off X ray might not cut off the
XX ray or that the order of sensitiveness of the
fluorescers might be changed when retarding
substances intervene Try experiment by Eyes
photo on slides with different absorbing screens
to see if screen acts alike on all - Make a specially
well made slide with all the fluorescers then absorb
by plate glass, then air then aluminium etc
if all act alike then its all X if not then there
are other rays or many rates of vibration each
rate having a specific fluorescer, not so absorbable
by the screen

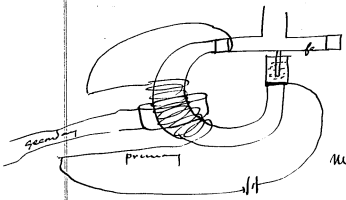


Lead plate fine 002 hole, look fluoroscope by magnet pole also light ray also jump spark on ray just as it leaves lead to see if it can be affected by flame arc light mag etc.

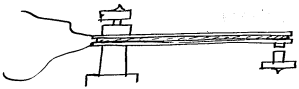
January 22 1903



Vibration disturb filings & vary magnetism.



Double action.
Magnetism & Current



Engraph action annual membrane KOH, nearly dry two platinized springs possibly glue rush of liquid changes stiffness on one side relaxes other stiffens hence spring curls

possibly a long piece of Carb Strontia with Koff. + foil pasted on sides would cause bending

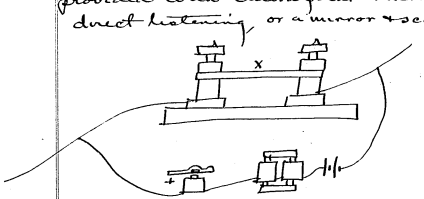
Perhaps in photographing fluorescent slides different results be obtained by having them in magnetic field—

X Ray tube—Iron plate, try effect in magnetic field—

Connect wire to top of flag pole on Laboratory + connect end to X ray tube at top + bring down into Galv Room—

Do not forget to make experiments at Ogden over the ore body for sudden changes in earth Magnetism also for sounds due to rapid vibrations of ore body brought about by Cosmical magnetic changes Sun spots vibrations affecting the Magnetism Aurora,

Possibly there are very rapid Barometric changes or waves continually occurring that could be detected by an Aneroid diaphragm provided with Carbon point Microphonic direct listening, or a mirror + scale,



X Carb Strontia, Koff— drives on and + opens Circuit =

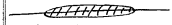
Jany 22 1903

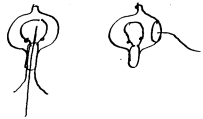
spectroscope

see if X ray passing through prism affects the Lines

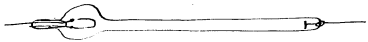
Jany 26 1903

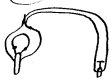
Complete the experiments with the Center wire in Lamp bulb also with platina foil outside the bulb – get quantative measurements;





Solid glass heat & use
Current blackening wire,
use Lead Lime, Glass,
Borax fused also other clear fused glass like



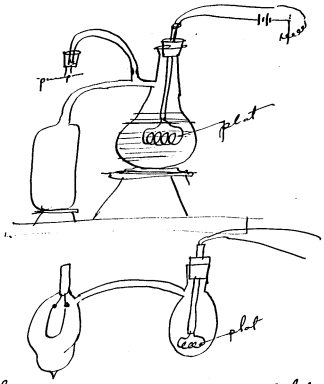


for Center wire experiments,

Make smallest Pea lamp with lowest voltage that will give current ~~[illegible]~~ possibly 1 or 2 Volt battery, see if X ray affects the Current given to center wire Try alternating Current possible that Center wire will give straight Current, & act as a transformer – Try Center wire Lamp in Cold Oil see if affect Current, also outside pt foil Lamp – Use photometer & Weston & bring up 6 Lamps by Kind tube beat determine highest candle power –

Try and reproduce the iridescent film within the Lamp bulb when Paraffine is inside & bulb heated to get Vapor —

Try distilling in Vacuum — by platina wire use paraffine etc see what it does — also try sublimming different subliming Chemicals in Vacuo — in reg way & under influence X ray light from arc Magnetic field, static etc,



Distill in vacuo & crack by heat of filament, get new Compounds =

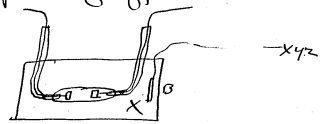
Try the best fluorescens for light & Becquerels phosphoroscope & get one that has the most brilliant phosphorescence for light for 1/20th of a second dying nearly out within that time so a screen can be made for the Kinetoscope & prevent flickering

Test all fluorescence phosphorescence for X ray + for light. when crystals are shaken in Vacuo tube in dark also grind in a glass mortar with glass pestle in dark – determine if all X ray fluorescers have the property of giving light when broken — possibly there are many chemical crystals which will give light when ground in the dark by a Count 100 also might be many that in Vac tube would also give light, Could put a dozen in one mix & if any light could run it down & find out the one —

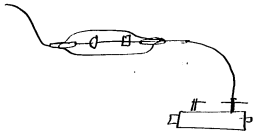
I believe that all good depolarizers when are hydroxides. Hence to make PbO_2 to work in Delande it should be made of Hydrated peroxide of Lead when mfg'd chemically – Mix with graphite + use Zinc amalgamated & H_2SO_3 — Try KOH + a colloid seperator —

Try if Delande CuO plate soaked in HgO in ammonia to get 5% HgO into pores of CuO plate Keeps volts up also Zinc + reg CuO in turns the amount of KOH,

Possibly CuO can be melted under pressure used to better advantage as to Voltage & cheapness of Mfg —



X ray tube with glass guards immersed in H_2O also liquids which absorb X ray in X lank notice phenomena also cool + hot liquids – also B plate in liquid give X-ray



High Vac (Very) X ray point, Continuous wire
face of Luminous —
(19) of our Vacuo space
Conduct better than the wire,

If Ions are free then $FeCl_3$ or $FeSO_4$ Electrolyte, in a powerful portent pole field should deposit on one side towards the field

For monochromatic Light, Bromide of Sodium is the best salt to use in open flame
Hg for tubes.

Radium may be radiant matter at ordinary temperatures while other matter would be radiant at higher temps by photology thro opaque sheet from incandescent metals kept hot by flame or Current, also in Hydrogen flame also monochromatic light from salts of metals say Bromides by wick in flame give 24 hours time —

Make a transparent Cell that can be put into a Camera like a dry plate use say Cu Electrolyte, + polished silver plate + a wire of Copper + focus a picture on plate from light of arc or sun often deposit Copper with extremely weak Current or deposit will just show in 3 or 4 minutes, see if light affects deposit, so as to give a picture possibly following

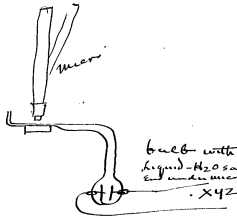
would work — use no current but a highly polished plate of a metal in the solution of a metal just below it in the electrolytic scale one which the plate metal will not reduce, possibly by the aid of light the metal will be sufficient to reduce the other metal from the solution & deposit thus giving a picture — There is quite a field here. If a Quartz lense is used to use polished plates of the metals immersed in various solutions & then by the action of light especially Ultra produce a reaction between the highly polished surface of the plate & the solution — possibly in some cases organic matter would be useful to assist —

Try Chloride of Sodium solution & grid with iron to take care of Hydrogen & see if Chlorine bleach of silver is blackened if not develope & see Try acetate Pb Mn Ni Co salts & make black oxide deposit very faint — Then with current when picture is focussed on polished plate.

Use spectroscope and monochromatic light pass X ray through the light try different vapors of metals especially he any metals in flame in air try tube other metals in vacuo tubes also in addition to X ray put both in powerful Mag field.

Try capillary bulb ~~with~~ 1/4" dia fill with good absorber X ray ~~test~~ of X ray

moves capillary Column absorbs Column under Microscope —



above scheme could be applied to observe many things —

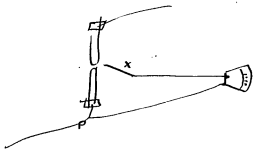
Celluloid cell with different Electrodes solutions with galv for voltage put in Mag field also use cell as a dielectric also act on it by X ray or both or one Electrode also in out Mag field, also heated + cooled + while charged.

Make a small coil with inside big enough to take the thermo alloy buttons we made by electric furnace + by galv Rick method test for magnetism,

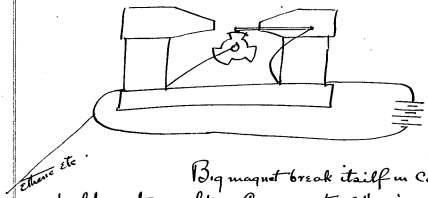
See if X ray affects the catalytic action of Platinumblack

Find a semi-permable substance for different rays from Vac Tube to seperate the dif rays + Photo them —

Send mechanical vibrations into a long buried steel wire use microphone point on the end of the wire to make a sound have this sound control a 2nd mechanical vibrator to send into 2nd wire with repeators might go as far as Phila — The internal knock of the molecules by surrounding end with coil + use storage batty + break wheel. 2 or 300 amp Mag spark break — or Marconi ball spark, or heating + plunging in Water



See if Center wire idea applied to one light will give Current, bare wire X — or X in a Vac tube might do something —



Big magnet break itself in Cone field get snap like a Cannon. try Etheric & XYZ.

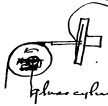
It seems to me that a peculiar thermo could be made by having a metal with very low specific heat. like Lead joined to one of high spec. heat. & only get current by momentary heating the low spec heat metal would get quite hot before the other showed much of any heat this should do something although when both were at same Temp would give nothing possibly it might give XYZ if no Elec By proper commutating of the heat powerful thermo currents might be obtained

Spec H wood charcoal	0·24
Crystly Boron	0·25
Magnesium	0·25
Lithium	0·92
Lead	0·03
Bismuth	0·03

perhaps the momentary kick of Halo when one drops a metal in an Electrolyte is due to above action
Mg + Bi or Pb should make good combination

as spec heat of Electrolytes is high + head low a Commutating head wheel might give Current by dif of spec heat —

Why is it that when an X ray or lower stage of Exhaustion tube is sparked that rubbing finger over glass produces difference of friction it acts like Chalk of Motograph — that shows a static motograph is possible.



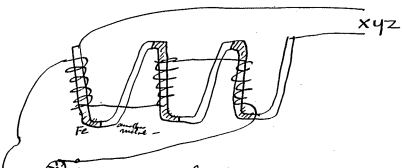
Glass cylinder Very thin inside filled with Hg — + connected to Earth, gold foil rubbing on glass + Connected to Diaphm —

Melt some Magnesium - do Aluminum in very high Vacuo + pour to one side of bulb cool — use Current to melt, I think both are alloys with their own oxides + in this way can get them pure possibly they could be distilled in high Vacuo —

It is very strange Mg + Al gives no coloration to Vacuum tubes can it be that CP metals are transparent —

What effect will X ray have on a Soap bubble.

Make some of the easily fusible glasses such as Borax, Borate Lead, Apatite + see if they can be blown into X ray tubes —



1/4 Ebonite strings hanger — Molecules disturbance give wave heard on XYZ Recor

If ions migrate different velocity then a Vane or plate suspended in electrolytic cell. can be detected by a mirror & Beam light movement take place by unequal movement.

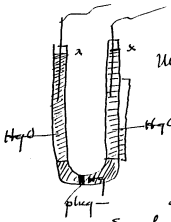
A Platinum negative should be capable of printing by X ray as Pt absorbs ray —

In addition to the electric wave of an oscillator on coil used by Marconi there must be a sound wave sent into space perhaps a flame would detect it. a million vibrations a second would require a resonator 1/64 long possibly a porous plate 10/1000 thick say 1/4 dia connected at base of sensitive flame the pores would act as resonators & affect the flame if this is so possibly the Molecule might work instead of Branly the friction being given on dry porous substance. by rarification & condensation.

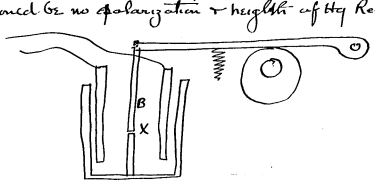
If X ray is due to particles shot out then a disk of platina 1/2" dia suspended by single fibre inside celluloid Cover to keep air currents away & Scale provided with Mirror scale & Lamp & screened from X ray or half of it should give a deflection

to my mind what is called X ray is a sound wave of a million or more per second a throw of atoms.

X ray bulb within another bulb with electrodes one of steel to get very high Vacuo & see if X ray passes through the high Vac from the tube X coated to X ray point, while the residual molecules are used in the inner bulb to give the concussions to produce the ray. The ray itself may not pass through the higher Vacuum which is too high for production of X ray



showed Gr no polarization & weight of Hg Read off.



Sparkless make and break, Rubber cell Sulph Zinc Zn Electrode X partition upper half moved up & down liquid conduction practically stopped when B touches X Elc could use magnetic & make automatic vibrator, Also KOH & Ni $(OH)_2$ pockets both sides —

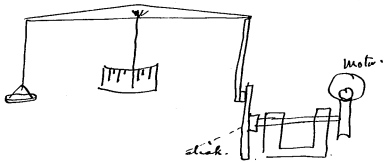
January 26 1903

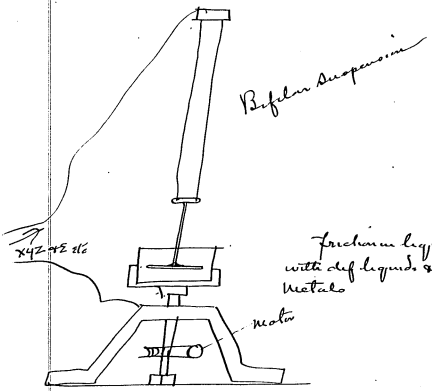
Storage Battery.

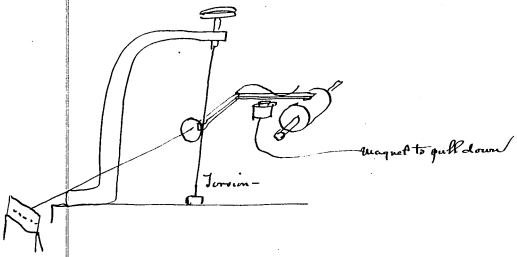
KOH Electrolyte saturated with PbO. grid filled with PbO_2 Hydrate Copper finely divided in other grid when discharged Cu_2O + Pb_2O_3 when chgd — Cu metal PbO_2 Hydrate

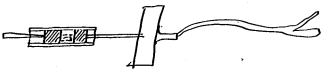
Copper metal not being able to reduce the lead, instead of Copper possibly all the metals lower than Pb in the electrolytic scale, from Pb to Cu —

It is possible that the friction between different kinds of highly polished matter is very susceptible to alteration by all forms of Energy stresses & changes of Condition & that instruments based on alteration of friction would lead to the discovery of many phenomena Especially as the apparatus is run by power & the energy or stress merely controls the source of power that moves the apparatus,

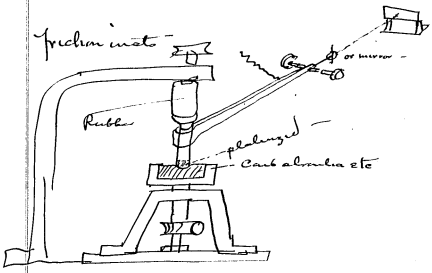


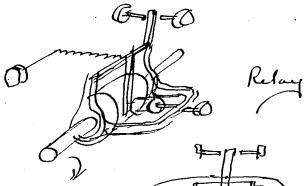


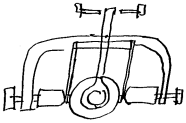




Branly to telefone - movement powder
makes sound







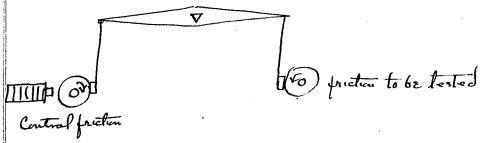
General Experimental purposes
Chloride Silver fused in an atmosphere of Chlorine is perfectly transparent
Ditto Bromide of Silver in atmosphere Bromine

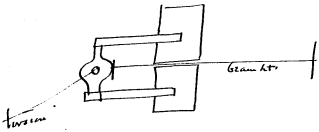
ChlK BrK KI from clear crystals produce on fusion perfectly clear masses,
How act ChlPb in atmos of Chlorine —

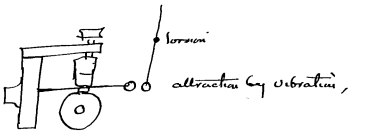
Arsenic sulfide with Sulphur 3 of Sulphur to 1 of AsS solidify to soft amorphous mass becoming hard & brittle after a week
Possibly good for Phono cylinder —

What is the effect on a Ring armature if wound with a coil & two rings to take off current, & over this the regular armature winding & Commutator.

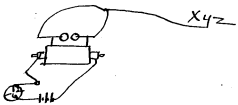
friction insts







High notes in Matogh—



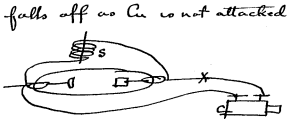
Bombardment sends waves molecular by condenser & rarefiction thro wire. use Cu Fe wire & XYZ inst at end. Cut off all Elec by burying wire 3 ft in ground ~~wire~~ wire 100 ft long. Above device gives Millions atoms knocks per second. shown gives XYZ at great distance over bare wire buried in earth possibly X ray tube give big knock—

I am almost sure a primary coil giving Etheric will do wireless as good & not better than Coil. all that is necessary is very sharp breaks & great amperage with but few turns,

Possibly a storage battery could be made with both Electrodes one of spongy Cu in KOH the other ~~[illegible]~~ plain Copper on oxidizing goes to Cu_2O The plain Copper forms bottom of cell. in which Tellurium powder covers on charging spongy Cu oxidizes to Cu_2O while Te Combines with H to form Hydrotelluric acid + K salt, on discharge O oxidizes H + precipitates Te to bottom cell ~~[illegible]~~ Galvanic probably in this

Put a little test cell Ni Fe storage in strong Magnetic field + see if action of Magnet on Fe affects amperage or Volts while being chgd + discharged perpendicular at right angles — No effect.

Hydrated Peroxide Lead in Copper grid. Copper plate. Electrolyte Sulphate Cop
Chgd — Copper PerOxPb + saturated sol SulphCu
Discharged — OxCu PbO_2 reduced to Ox + SulphPb
no reduction Pb on Cu as too low in scale.
nothing falls off as Cu is not attached by SO_4



Try effect Shunt S with Fe around also at X also mass of Condenser.

The universe is composed of matter + the medium

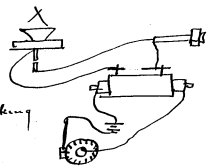
Matter disturbs or distorts the evenness of the medium or Ether.

All transformations of energy is the transfer from high to low pressure or equalization of distortion in the medium—

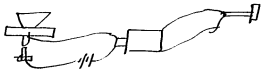
Transfer is brought about + is transmissable by the great difference between the inertia of matter + the inertia of the medium

In a Battery for instance the oxidizing metal acts by its inertia as a fulcrum or abutment to throw out the stress, The wire of the circuit is the plane around which the wave passes the inertia of the matter composing the wire permitting right angle ramifications + condensations in the medium without loss of Energy in the medium but the wire not having perfect inertia is heated at absolute Zero the wire would have, probably perfect inertia relative to the medium The stress travels along transversely like light, the waves being very long at right angles + unlike light which are very short,

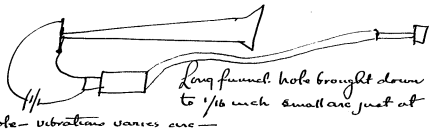
Feby 1, 1903—



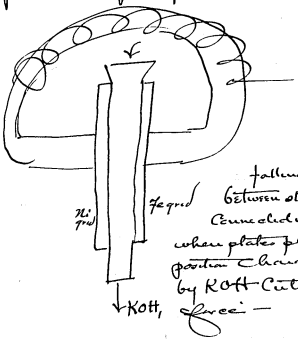
Jumpspark wheel making
2000 vib sec—
by talking in X
Varies—

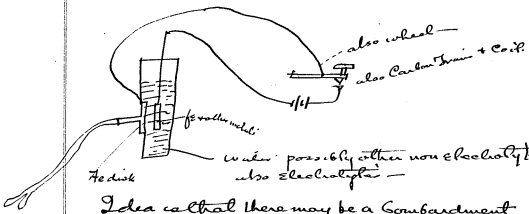


small arc, hard to vary its resonance,



Try using Molograph with Carbonate Strontia, as a battery when turning— it reversible see how voltage is— also what amperes can be got from it— possibly a low resistance could be obtained also try with different metals, both holding Chalk & point, might be lot of phenomenon come out, in Chalk Cap form precipitates to see if Caust better Even Carb. Strontia, same permanable precipitates.

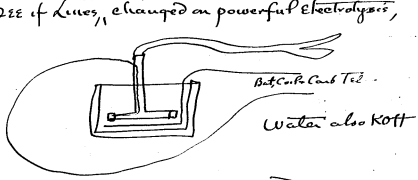




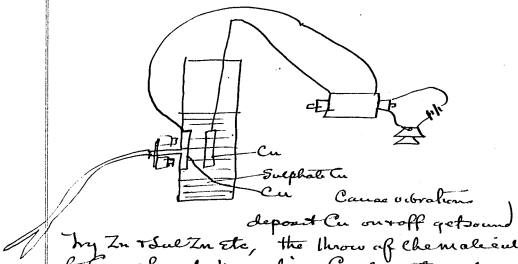
Idea is that there may be a bombardment of molecules producing pressure. possible an electrolytic compound could be thrown into + out of solution for each reversal of the telephone Coil current + the osmic pressure produce a movement of the diaphragm — Some electrodes could be used that permit a small amount of oxide to go into solution + then plate out. Al — + Mg — dia or electrode Reverse Ct Try alcohol, + Organic Clear + with things in it, try in Mag field also as dielectric also beam Light Heat, X ray —

or absorption

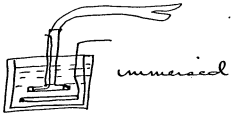
Qzz if Lines, changed on powerful electrolysis,



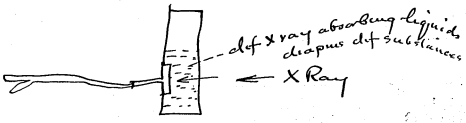
Animal membrane see if forced Osmose to + fro by alternations produce sound.

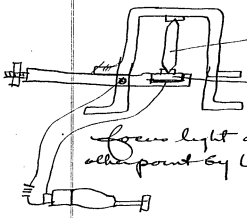


Try Zn + Sul Zn etc, the throw off the molecule of Cu showed more dia Co deposits under strain might be good — Lead + Hg molecule being heavy might be good — also put a magnet near dia + use sulphate non the non deposited is attracted + when off attraction ceases showed Bano limit to thro — possibly the dia could be of mica with 1/16 thin disk of Cu in center + non deposited would be concentrated, possibly 1/1000 inch point + magnet get within .003 of the end of point would be very sensitive,



This form would be very handy to try quickly a lot of experiments on this principle — make + break whoof. also Carbon Tel + Coil Perhaps dielectric oils give sound sensitive flame instead ear tube might detect sounds of extraordinary pitch,





Focus light on ship + control beam at other point by telephone

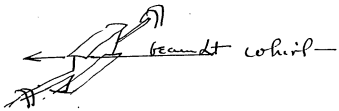
July 1 1903

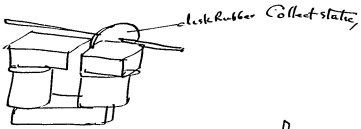
On silver discs for Carbon/telefone possibly a number of metals reduced by Hydrogen from their oxalates worked work — Plat black Ag Cu Ni Co Bi Au Pd Ir Ru also Ni S + Si amorph. our battery Graphite also amorph Graf purified as we do it —

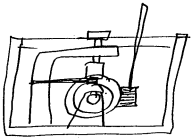
Experiment well on sensitive flames as it may be possible as it may be possible to get them in connection with a telephone far more sensitive than the ear Could be used with above device to repeat + then get infinite sensitiveness + rapidity possibly sensitive flame would be modified by strong field mag as it has great influence on flames; possibly waves could come into magnet + influence the flame

Possibly Combustion in flames are a series of Explosions (?) molecular Explosions at combustion they might be propagated to a distance to affect another flame both sensitive a shutter + telefone showing it up —

as a flame is so easily affected by a magnet perhaps it would give an alternating Current if placed between prongs of a permanent mag surrounded by a coil & a telephone used with revolving wheel etc to break it up into waves or a Branly would detect the Current or a Bifilar Electrodynamoler with no iron This would be a great scheme the molecular explosions disturbing the lines of force possibly a trompe Could be used with the gas to throw the flame in front of the field & then give sounds or waves







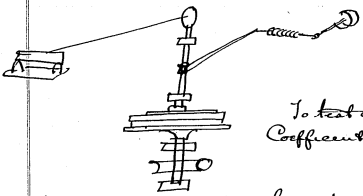
A sort of a Motogh to test thermo current due to Rubbing The cylinder being of one metal & point the other — immersed in distilled water, test Current with Weston

Feb 1 1903

See if the scintillations of Mg Fe etc occur under distilled water also gasolene also in a Vacuum! & if preserve their character, see how scintillations changed in Magnetic field — or within a helix with powerful current passing also in powerful static field!

Try X ray 24 hours on a flower having leaves guard 1/2 the flower & leaf by sheet lead.

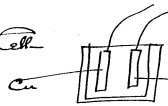
Coefficient of friction should be changed by X ray —



To test change in Coefficient of friction

by X ray Light etc glass discs ground dead flat

Storage Cell



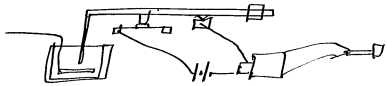
Liquid Cerous sulfate
finely divided Cu

Cu

Manganeous sulfate, also sulfates of metals which are decomp by H_2O. & which form ous & ic sulfates.
Chgd Cu Cerric sulfate, Dischg Cerous sulfate Cu_2O —

Feby 1 1903

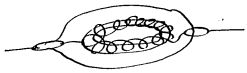
Possibly instead of Cu metals further up the scale could be used so long as they will not reduce Cerric to Cerous of themselves possibly Pb Sn Sb Co — possibly Fe but doubtful — all finely divided with Hg mixed or Cu Hg mixed with them — Thin grids possibly Cobaltic + Cobaltous Sulfate old be used, Better try Cerium hydroxide once more getting pure stuff mix 5 + 5 graphite + 400 poison possibly get it act as well as Ni hydroxide,



Electrolytic cell —

Current or X Y Z Either moves Pt wire by surface tension or gas formation works Microphone

Deposit Fe on glass in high vacuo do it on pump use double electrode each a loop so a current can be passed through loop to heat loop up + drive off gas etc then by spark deposit on glass anode protected Want to see real color free from oxidation Try all the other metals including Silicon Mn Ferromn Tungsten Cr Te S Se C Graphite Sn Sb Zn Cd Ag Cu Pt Ir Ru Pd Ru Or Pb Th Co Ni pyrosulfite Sulfides dont deposit so will be opaque Then try things with them absorption in spectroscope X ray photo by thru fluoresce by Light thru, Conductivity etc



Very high Vacuo small ring magnet, with coil wire Balance in bridge & Read Rick right along as Vac gets better note any change

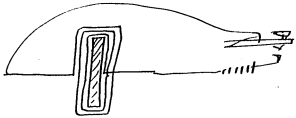
Also wound spool with 1000 ohms & put in Vacuum put in bridge & measure Res as Vac goes up Try of rapid breaks & reversing makes any difference.

If Brauly will work surely a gold leaf or Equivalent will work and a beam of light or shadow could be used to read signals by also use as XYZ Recvr

Try jump spark points with spark adjusted so it will not jump except in Ultra Violet then try if any opaque thin sheets will conduct ray try nimochromatic & also proximity of masses of metal, also proximity of heated metal & Chemicals, might some give radium Emanation & act like Ultra Violet, X ray —

Since Nofe storage bat has such enormous discharge rate could use a primary like Etheric & by breaking 1000 amperes between poles of magnet get an Etheric so tremendous that the X ray tube would give extraordinary results, also wireless taking it should make enormous Voltage of secondary used & a vicious spark between balls The number.

of breaks could be one or two so a few turns wire which might melt in one second, with 100 amp would stand 1000, or more for fraction of a second could use in oil also a simple coil without iron would give enormous results. possibly this would have to be in oil although oil would make wave less sharp possibly put in Vac tube could get new results + self induction would be at minimum - This on end of iron wire should act as a powerful molecular sledgehammer for X y z waves Remember old jumbo at Gorrick jump spark as amperes went up.

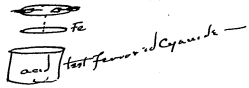


Make iron core condenser a la jumbo this.

wind - foil Copper wound around so have 10 or 15 times as many disks as were on jumbo moulded with japanned bond paper baked then try with several hundred amperes diameter 3 inches put in oil + see about Ether X y z etc.

If in X ray tube an atom strikes the glass Wienatzes passes through glass + impulse is given an atom outside by stress thro glass + this atom by its velocity is thrown into the flesh - Then a dish containing acid in which

The most sensitive reagent for a metal is in acid solution the interruption of a very thin metallic plate between X ray tube at top of cell & the acid the metal atoms phoned or thrown into the electrolyte & in time give color reaction,
or if thrown on a platina plate the metal would be plated to it & after collecting for a while could be dissolved off in a minimum of acid & tested by the most sensitive reagent, the phoned proof of matter is actually thrown by the X ray —

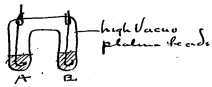


Perhaps a more sensitive test would be to put a platina plate within a hydrogen flame & then between the X ray tube & flame put the very thin metal or material & throw the atoms against the platina plate in the flame where they would give spectra, lets crystals could be used —

Perhaps by using a hydrogen flame & metallic nozzle to earth & platina loop with a metal or oxide of high fusibility on it in flame that it could be used as a Branly or XYZ with spectroscope,

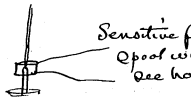
Make a Tungstate Ca screen the Crystals being mounted on thin lime glass by fusion then try effect of sensitiness increased or diminished by heat, magnetism, or both by the fur other fluorescens

There might be a storage cell in high Vacuo to get low temp oxidation, thus

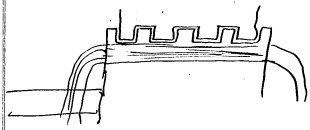


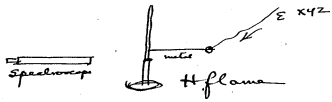
End contain Dry chemicals high 1200 Volt Current, produces Vacuo Electrolysis finely divided Fe in one + Dry $N_2(OH_2)$ in other $PbO_2 H_2O$ in one Zn as Mn etc in other passage of a spark or Ct in one direction charges + in the other direction discharges + O Combining with Metal gives light at very low temp Cold Light like oxln of Phos

Possibly tubes exhausted beyond X ray point will be best to get XYZ or connect with the medium free of matter — remember steel Electrode absorbing residual as 10" spark wouldnt pass, then when no spark pass perhaps the 1000 ampere Elheric Coil will cause production of another kind of ray or XYZ. Try this kind tube mag field Ultra [illegible] —



In small motor for automobile - increase magnetic radiating surface thus

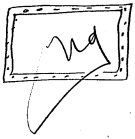




When wave comes spectra appear - diff metals — salts etc.

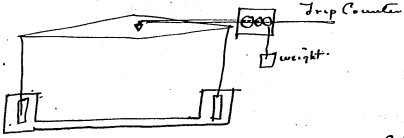
Oxalate Uranium very sensitive to light actually a solution of Oxal Ur decomposed by light Co Co_2 Remarkable salt,

Dry plates, light + cheap for photghy.



make like Kinato steel strip

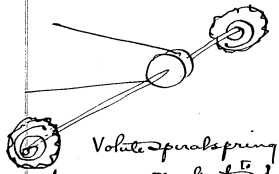
Feby 5 1903 —



Meter KOH Solution No pockets — Shift Hydroxyl by Current around shunt, should be perfect meter —

Feby 5 1903 —

The cups could be of platinum or pure nickel possibly HgO instead $Ni\,OH_2$ wold work, Even if mixed with HgO as in battery might do, shunt in main line, the suspension wire could pass thro fine hole to prevent Carbonating



Volute spral spring to connect driving sprocket & shaft to equalize also drive chain on starting.

[ITEM FOUND IN BOOK]

#1

Make an alloy of
92 parts of Cadmium
+ 7 parts of Bismuth

Mix 60 parts of the
above alloy with 40
parts of Antimony

Make Enough to make
a Cylinder for Chalk
Telephone

(0)

[ITEM FOUND IN BOOK]

~~Zinc 85~~
~~Bismuth 15~~
~~Antimony~~

#2

Make alloy of 85 parts of Zinc
15 parts of Bismuth.

Then take this alloy &
mix 35 parts of the alloy
with 65 parts of Antimony

[ITEM FOUND IN BOOK]

Diorite - Diabase
Stable gangue
Every granite sample panned & plain -
Sand panned back - plain & panned
Samples every kind Rock in bank - Crushed - plain & panned
Samples Cr panned all known ore samples - lost -
" " " Pulling now ore & gangue
Samples K & Rizon known samples -
" Oregon Nickel -
" Trade Oregon samples -
Cannot Rock samples,
Limestone " " panned & plain -
Black sand samples -
Diamond gangue removed -

[ITEM FOUND IN BOOK]

Light fluorescence —

Calcium Carbide — to arc

Lithium Oxalate "

Balmain's paint Sun

Sulphide - Barium

" Zinc —

" Lime,

Strontium

~~Molybdate Calcium (fusion)~~

~~Tungstate Calcium~~

[ITEM FOUND IN BOOK]

~~Barium~~ Best

Platinum Barium Cyanide.
Calcium Tungstate
Cuprocyanide Potassium.
Strontium Tungstate.
Mercury Diphenyl.
Salicylate Ammonia.
" Strontia

[ITEM FOUND IN BOOK]

Ores –

Monazite sand-pieces.
Calcite
Fluorite
Rock salt
Zircon Hyacinth
Danburite. (Boro silicate Ca)
Orthoclase andalusite, ($SiAl_4K$)
Prehnite,
Pyromorphite.
Apatite.
Herderite. (phosphate of Ca)
Wulfenite. ($MoPb$)
Scheelite.
Zn. Tungstate has apatite better than $CaWO_3$ – fusion

[ITEM FOUND IN BOOK]

Zinc Tungstate fused.
" Phosphate
" Acetate
" Molybdate.

Gold & K. Cy - good
Zirconium & K Fluoride - good
Mercury Oxycyanide
Caesium Rubidium & Ammonium Bromide.
Bi & Co Salicylate
Bi Subbenzoate.
Sodium & Potassium Carb -
Lithium & Benzo-salicylate
Lithium Benzoate
Acid Dulfosalylic

[ITEM FOUND IN BOOK]

Silver Carbonate
" Chloride.

Sodium Cresolinic
" Salicylate.
" Fluoride
" Bromide.
" Carbonate,
" Chloride
" Tungstate,

Strontium, Salicylate,
" Acetate,
" Tungstate ferrous
" Molybdate,
" Chloride

Uranium Acetate,
" Nitrate
" Sulphate,

[ITEM FOUND IN BOOK]

Molybdate Calcium (fusion)
Tungstate Calcium "
" Copper "

Lithium Bromide
" Benzoate

Lead Tannate
" Tetrametaphosphate
" Bromide.
" Chloride,
" Carbonate.

Molybdic acid –
Mercury Bromide
" Phenylate
" Subchloride
" Mercurous Chloride
" Mercuric Chloride
Mercury diphenyl.

[ITEM FOUND IN BOOK]

Benzoate Ammonium
Salicylate "
Barium Fluoride
Tungstate of Barium - fusion process
Barium Sulphobenzoic
Tungstate Beryllium precip
Sulphate " Cadmium by fusion
Bromide "
Chloride "
Iodide "
Oxide Cadmium
Tungstate "
Bromate Cadmium -
Calcium Formate
" Nitrate
" Salicylate
" Sulphide.
" Fluoride
" Phosphate.
Pectolite (Silicate Calcium)
Soda Lime.

[ITEM FOUND IN BOOK]

4265 – Strong Cuprocyk & SbCy
4270 Strong " dissolved in sulphur salt.
6424 Strong at 1st instant – Sulfate Ur & Ba
6433 Strong Sulfate Uran & Pb
35371 Strong 2 grms K Tungstate & 2 grms BeCl
1538 Fair KBr & KCl
33948 Fair 2 grms K Sulfite & 5 mlg CaCl
4267 Strong Cuprocyk & MoCy
4268 Strong " & CeCy
4148 Weak Permolybdate Tartrate & Zn Tartrate
4246 Strong Cuprocyk & MnCy
4263 Strong " & PbCy
4264 Very Strong " & BiCy
7333 Phosphorescence Phtalic acid & K_2CO_3 & S_2O_3
7579 Strong Sulphosacchrica & Zn(OH) & S

[ITEM FOUND IN BOOK]

21094 - Strong - Ca Sulfo-meth S.S.
21087 Strong Sr Salicylate.
30418 Very Strong - KCl 2 grms. Ur Sulfite 2 gr yellow C
32967 Strong 2 grms Zn Br 2 grms Ba Fluoride
33039 Very strong 2 grms Ba Br & 2 grms Ba Fl.

4253 Very strong - Cuprocy K & Cd Cy
4254 Very strong " & Cr Cy
4259 Strong " & Fe cy
4260 Very strong " & Hg Cy
32056 - Strong 2 grms Cuprocy K & 1 mlg Ur Sulfite.
9002 P-Strong P-Cresolinic Ac & Carb of Na & Bi
32133 Very strong 2 grms Sr Br & 2 grms Zn Cy
32825 Very strong 2 grs Cd Br & 3 mlg K Cy
32811 Very strong 2 grms " & 2 grms Ca Borate.
8074 9000. P-Cresolinic Ac & $Al_2(OH)_6$
8175 Very strong - Borobenzoic Ac & K_2CO_3 & $CaCO_3$

[ITEM FOUND IN BOOK]

2706 – Very Very bright. Hydrofluoric Acid NH_4OH, 4/16/90

4868 – Ur Cy & Hg Cy

35269 strong 2 grms Na Tungstate & 2 grms CaCl

35305 fair " & " CaFl

35293 strong " & " Ca Borate

35290 strong & 9 mlg Ca Borate

35395 strong " & 2 grms Ca Borate

35389 fair " " Ca Silicate.

4263 Very Very strong. Cupro cy K & Pb Cy

4254 strong " & Cr Cy

4264 strong & Bi Cy

4260 strong & Ur Cy

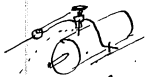
8079 strong P-Cresolinica & K_2CO_3 & $MnCO_3$

[ITEM FOUND IN BOOK]

21135 Very strong – Uranium acetate.
6157 strong M-Cresotinic + Sr_2CO_3
30169 strong SS 2 grms Sr chromate + 25 milg $AgNO_3$
20807 strong. Sr Salicylate
30671 strong SS 2 grms NaCl + 3 milg KCy
30791 strong – 2 grms Sr Phos + 3 milg AgCl.
30790 strong 2 grms di Phos + 1 milg AgCl.
31683 - strong 2 grms CdCl + 2 grms Ca Phos
30009 weak – 2 grms KCl S S S Radium
30047 weak " K Sulfate S
35473 strong 2 grms K Molybdate + 2 grms CaCl
35971 strong 2 grms K Nitrate + 2 grms Mn Sulfate
20234 Very strong. Iodo-sulphosalicylic acid
20214 strong Zn Salicylate
20194 strong Fluorine S S

Notebook, E-4297

This notebook covers the period February-December 1903, with a few entries from 1912. It contains notes and drawings transcribed by Edison from other notebooks, including many entries from N-03-02-27.1 and entries related to material in N-03-12-29 (see "Notebooks by Edison"). The experiments pertain to a variety of matters, including electricity, electromagnetic radiation, phonographs, photography, and telephones. There are also lists of chemical compounds under headings such as "gelatinous substances," "gummy chemicals," "soapy chemicals," "pitchy masses," and "chemicals which can be drawn into threads"; and a list of slides used to test compounds that fluoresce with radium, with an indication that the radioactive samples were received from William J. Hammer. Other entries deal with amplification, phonograph recording and record molding, x-rays, storage batteries, and experimental apparatus combining cathode and other vacuum tubes with electrical devices. The first page is inscribed "Volume No. 2 Expmtal Researches." The book contains 404 numbered pages; many pages are blank.



Phonogh with glass cylinder removable
Connected like a record, Insulated point X
of various metals — instead of glass various
metals etc very highly polished & cleaned by
abrasion & quickly used — The point is insulated,
The point is connected to any source of energy
Xyz Elec Etc, and adjusted close to cylinder
where cylinder runs out use a phono with
20 Threads to inch & put point on a lever having
saphire edge resting on cylinder but not in
track of the record, This will take care of
eccentricities of cylinder — Idea is based
on fact that coins laid on glass & then
removed leave an invisible record which become
visible when breathed on, also when the
coin does not touch the glass — there is some
emination given off that produces a peculiar
surface — perhaps a ~~stress~~ wave will do
same thing or by using metal as we could
get developed by Iodine ~~Hg & other~~ vapors —
There is a big field here, The point could be
adjusted to 1/1000 inch of surface,
Photo Emulsion could be put on glass cylinder & record
made in dark room — Phono could be regulated to
go slow —

Gelatinous Substances

Acetate of Cadmium
Allophanate of Sodium
" " Glycerylf
Allylate of Potassium
Allyl Sulphide.
Apiin
Anicine, neutral sulphate, dries to horny mass
Caproate of Potassium Jelly—
Carmufelic Acid Earth metal salts gelatinous
Cetyl-Xanthic Acid Zinc salt "
Chondrin
Chrysanisic Acid Co+Cu salts "
Cumylide of Potassium "
Curarine Horny mass
Ferrocyanides of Tin + Zinc Gelatinous
Cyclamin
Daphnin Lead salt. "
Delphinine Sulphate "
Elemi Resin NH_4 Converts to "
Sulphethylate Copper — ditto Gold — "
Ethylene Oxysulphydrate forms crystalline salts which at 100.C. Glutinous
Euchroate of Ag Gelatinous
Euxanthate Ag "
" ammonia gives with Cupric salts a jelly
Bromeuxanthic Acid. its salts are Gelatanous
Chloreuxanthic Acid " "
Nitroeuxanthic " "
Fibrin Gelatinous
Formate of Tin "
" Uranium "
Gallotannate of Antimony I " ditto Fe salt;

Oxyquanine gelatinous
Dichloroharmine jelly
Benzo-helicin gelatinous
Imasatin action KOH "
Inosic acid Aq salt "
Galapinotate ammonia jelly
Lauric acid Sodium salt " opaque
Lecanoric acid Calcium salt gelatinous
Meconic acid Calcium " "
Morindin "
Mycomelic acid " transparent
Chloronaphthalic acid Lead salt "
Nitrate Zirconium basic salt "
Nitrosacharose glutinous ropy
Parellic acid gelatinous
Pectic acid pectates "
Pyromeconate ~~Magnesium~~ no ? mean Aq salt gelatinous
Quinone precipitate with basic acetate Pb gelatinous
Racemate of Nickel "
Salicin acids seperate it from H_2O "
Saponin Neutral Pb acetate gives " precip
Silicate Soda "
Solanine sol in acids seperated by alkalis gelatinous
Salts Solanine dissolve Alcohol gelatinous masses
Succinate Lead basic salt sticky glutinous
brittle on cooling
Sulphoglutinic acid action of sulphuric anhydride in excess of Naphthalene. glutinous
Trichloronaphthylsulphurous acid ammonical cupric salt filimentary jelly
Tetrachloronaphthylsulphurous K salt gelatinous
Sulphate Alumina Tetra basic salt transparent
vitreous fracture transparent jelly when wet.

Amylsulphate of Alumina gelatinous
Mercuric salt soapy +
Syntonin Muscle fibre gelatinous
Tartrate Lead "
Tellurite of Cadmium "
Theobromine dis In Baryta water to white jelly when solid
Stannic Acid gelatinous dries to hard translucent
lumps like gum arabic
Stannate of Ammonia gelatinous
Metastannate Potsm "
Metalungstic acid colloidal "

Gummy chemicals

Aconitate of Calcium gum-
Amylamine Sulphate gummy
Amygdalic acid "
Anise oil p 298 Vol Watts mentions gummy salts
Sulpharsenate Tin gummy
"arsenite " "
Asparatate of Magnesium - "
Benzoic acid action chlorine tough gummy mass
Dibromacetate Lead tough ——— " "
Camphorimide " transpt
Chlorocerotic acid gum—
Chelidonine acetate gummy
Citrate Alumina gum.
" Baryta mono gummy mass
" Mg "
Conine action Br- "
Dulcisulphuric acid Ba salt gum transparent
Filicic acid Na salt gummy
Furfurine Phosphate " mass
Epichlorhydrin action NH_4 " "
Nitrosacchrate Pb "
Argyrescin under Horse chestnut " "
Hydrocinnamide after fusion trans amorp gum.
Acetolactate Ba gum. Copper salt amorph gum.
Methylactate Ag amorph gummy mass.
Malate Aluminum trans gum. Cu salt gummy
Iron salt gummy
Mandelic acid melts to gum.
Mannitic acid gummy mass
Sulphomolybdates Cerous salt gummy
Morphine pyrotartrate fissured gum.
Oxalate Vanadium blue gum— translucent.
Dimethoxalic acid gummy mass.
Parabenzene action H_2SO_4 forms an acid Ba salt gummy

Hypophosphite Alumina thick gum when evap in
Vac dries to shiny gummy brittle mass ditto
Glucinium salt—
Phosphate Titanium gummy
" Zirconium " translucent when dry insol H_2O
Pyrophosphamates of NH_4 + K gummy
Pyroracemic acid B Kind forms amorph + gummy salts
Pyrotartaric acid Mg salt gummy very friable mass.
Pyrotartrimide dis Pb oxide dries to gummy mass
Quinates Yttrium + ferric salts gummy
Quinovin amorp resembles Gum.
Saccharic acid. Ferrous salt gummy
Seleniocyanate Mg amorph Gummy Mass—
Selenite Al Transp't gummy mass
Zinc salt " " fissured—
Sulphocyanate of Sinapin melts solidifies
to gummy mass.
Solanine heated sealed tube with ethylic iodide
salts gummy
Xanthic acid Calcium salt Gummy
Ethylene-sulphurous acid Pb salt tough gummy mass
Sulphato-acetic oxide "
Ethylsulphuric acid Aluminium salt Gummy
Metatartaric acid Transp't Gummy Mass.
Glycotartaric acid black amorph mass.
Diacetotartaric acid Transp't gummy mass.
Aceto-tartaric ether action sodium gives transp't
gummy substance,
Tellurous acid K salt soft gummy coagulum
Stannic acid dries up to translucent gum.
Meta tungstic acid sticky gummy some salts gummy
Sulphomolybdates Gummy Amorphous.
Gum Dextrin. Gum tragacanth, Slippery Elm gum
Cherry tree gum. gum Arabic, plum tree gum.
Quince gum. Sunflower seed gum.

Soapy chemicals

Amylate of Potassium
Talc
Graphite,
Earth nut oil saponified gives hard soap
Iodide Cadmium
Meerschrum.
Beechnut oil soap therefrom.
Cinnamic acid action chlorine tough greasy curb,
Leucates K salt a soap
Mandelic acid K salt white easily friable
soapy mass.
Ricinelaidic Acid unctous tacky
Amylsulphuric acid Ca salt soft to touch
Mecuric salt crys nodules soapy + glutinous
Veratrol chlorine acts to make unctious mass.

Glassy + Transparent.

Amarine Hydrochlorate. trans mass.
Azobenzidine amorph "
Azobenzoyl "
Liquidamber Transparent.
Monobenzoicin, Benzoate Glycyl. at 40° C transpt
drawn into threads
Biborate Ethyl Transparent glass,
Camphoramic acid " Vitreous
Cinnamein Transparent
Cinnamene " glass.
Metacinnamine highly refractive glass like sub cut
with knife ord temp softens by heat can be drawn
out in threads
Citrate Lithia amorph limpid
" Glyceryl yellow transparent mass difficult
pulverize insol H_2O Al or Ether
Citrate Glyceryl basic ditto but melts 100 C.
Convolvulin drans resin.
Delphinine Sulphate, transparent mass.
Diffluan Vitreous "
Nuleisulphuric acid Ba salt gum Transpt
Fumarimide Transpt Resinous mass.
Garcinia Mangostana Resin Transpt amorph.
Glycerotartrate Calcium a glass.
Hydrocinnamide after fusion transpt gum.
Hyocholoïdic acid. Sodium salt in Alcohol perfectly
Transpt Varnish
Malic acid Pb salt Transparent pitchy amorph.
Menthol action Sodium Transpt mass.
Jethuride Methyl Nitrate Transpt amorph.
Permolybdic phosphate tenacious transpt mass
Sulphomolybdates Manganese salt trans Varnish
Neutral soaps of alkalis dissolved Alcohol +
distilled down + poured yellow glassy transparent;
Melted Sugar. Molasses;

Myroxocarpin Transpt glass
Tetrachloride of Dibromochloronaphthalene
heated above MP remains soft transpt amorph.
Oil Nutmegs deposits solid Camphor absorbs
11% HCl. + melts to transpt mass.
Codliver oil treated alcoholic ammonia forms
large quantity amide MP 93 C becomes solid
and transpt perhaps other oils do same.
Olivil Resin transpt
Sulphopicranic acid Transpt amorph.
Oxalate alumina " "
" Vanadium Translucent, blue gum.
Oxyquinine colorless transpt mass when fused
Pelosine Transpt Varnish Amorph.
Under Phenyl Benzoyl Watts Benzhydrolic —
Succinate Transpt Amorph.
Orthophosphate Alumina acid salt gummy fuses
to a glass.
Hexametaphosphate Magnesium dries to soft
tenacious Ammon Mg Phos dries to brittle
transpt mass.
Metaphosphate Ag melts to glass - insol water
Hexmetaphos Ag soft at 102 C + high temp
melts to glass. insol H_2O
Tetrametaphosphate Sodium precip gummy
Even when diluted 100 times when precip by
Alcohol mass ropy like rubber dries to
transpt fissured mass insol.
Phosphato Tantalic acid fuses to colorless glass
Orthophosphate Di Zincic salt. Melts transpt
glass insol H_2O
Quinine acetate fuses to colorless glass.
Chlorate Transpt Varnish Valerate solidifies
from solution as a glass.
Quinotannic acid. when mixed with Gallotannic A
dries to transpt Varnish.

Ethyl Racemocarbonate. one modification Transpt,
Rubian Dricoto transpt gum.
Rubichloric acid Pb salt, Transpt mass.
Stearate Ni Mang. Lithia transpt, glassy.
Selenite Zinc Transpt. gummy fissured mass.
Silicate soda
Gelatin.
Collodion
Silicofluorides Mg salt Transpt. gummy
Sulphonaphthalene mp 70 c solidifies transpt
Vanadious Sulfate blue Transpt
Sycocerylic Alcohol. after strongly heated
solidifies to transpt glass.
Sylvic acid Mg salt transpt resin.
Metatartaric acid transpt gummy mass.
Diacetotartaric acid "
Acetotartaric " " by action Sodium
Tetratartaric " " amorph.
Borate Lead. fused
Fused Borax.
" Microcosmic salt.
" Phos Lime

Pitchy Masses.

Hydride Chrisyl P Pentachloride converts to Pitchy Mass.
Brunotic acid "
Doppferite Pitch.
Tribromodioleic acid Ba Salt pitchy
Rosolic acid Pitch amorph
Sterine Pitch
Coal Tar Pitch.
Burgundy pitch
Woodtar pitch.
B.S. "
Petroleum distilling Pitch,
Sludge acid Pitch
Pitch from distilling Stearic acid.

Wax Waxlike, Waxy

Anamirtin waxy—
Andaquico wax
Amylmercaptide of Mercury.
Anrade waxy mass.
Dexchloro-camphor wax
Ceropic acid waxy mass.
Cerosin Sugar cane wax
Coca. wax from Cocaine mfg
Geocenic acid. waxy acid from Lignites
Hevecne distillation of Rubber action Chlorine forms Wax
Cerotic acid waxy
Melissic " "
Hydrides of alcoholic radicals higher series
will doubtless be found solid waxes.
Ceralene Waxy } under Hydrocembons Watts,
Melissene " }
Laurie acid. wax
Diamylene—Lepidine resembles paraffine.
Maltha Mineral Tallow
Myrtle wax
Myricin wax in beeswax insoluble in alcohol.
Bromotrichloronaphthalene B modifictn Wax like,
Hexachloronaphthalene Waxlike.
Ocuba Wax used in Brazil for Candles.
Oleamide action alcoholic NH_4 on oil almonds
Semi transpt at 75 C possibly good phono for mixing
or direct.
Palmitic acid. Wax
Myristic " "
Mannitic Palmitate solid white melts to wax
Palm wax hot alcohol seperates it into true wax & a resin
Peucedanin waxy mass from Masterwort
Aniline in Sulphide of Carbon converted in few days fatty mass

Ricinelaïdin solid fatty body action N perox on castor oil.
Selenium tetrachloride on reaction gives a wax
Myristin from Beeswax silky aspect,
Common Lilac leaves have waxy sub extracted by Ether.
Angelica Wax from Angelica Balsam.

Resinous Chemicals

Anisic Alcohol condd by H_2SO_4 to Resinous mass.
Nitroanisidine Br converts "
Bebirine heated with Chromic A Resin
Cerotene action Chlorine " Transpt.
Chinoline " " "
Cinnamate of Cinnyl Resinous
Nitrocinnamic Anhydride Kneadable Resin.
Codeine action Cl Resin amorph.
Colophene " Resin
Conine " Br oxdzd to "
Convolvulin " Transpt.
Crotonol distillation, Resin
Croton Oil. saponified Peculiar Resin —
Fumarimide Resinous Mass ~~Transpt~~
Garcinia Mangostana Resin ~~Transpt~~ Amorph.
Harmaline Sulphate. Resin —
Jalapin " Amorph
Triphenyl-leucanilinic brittle non-basic Resin.
Myroxocarpin Cl converts to Resin —
Marignaca Trinitronaphthalene adhesive resinous substance
Naphthionic Acid Nit acid containing Nitrous makes Resin.
Naphthalamine Chlorine forms Resin —
Olivil. Transpt Resin
Dioxybenzoic Acid action Nitrous fumes Resinous mass
Melaniline Hydrochlorate, action Cl a resin on Oxalate a Resin —
Phlorizin HCl converts to amorph Cl. to Resin.
Quercite = Nitroquercite Amorph Resin
Quinine trihydrate Resin.
" Hydroiodate Melts to Resin
Hydroquinine Resin amph.
Chlorosalicin Resinous
Bromosulphosalicylol. "
Monochlorosaligenin "
Saliretin "

Salvia - Sage oil - Nit acid converts to Resin.
Trichlorosantonin Alkalis Convert to "
Sassafras Oil H_2SO_4 converts "
Sinamine when heated Resinous
Sulphocyanate of Sinapine heated with ~~Sulphuric~~ Iodine, Resin
Solanine, Acetic Nit A Resin.
Naphthylmeconamic amph heated with Nitrite K Resin
Tungstate Alumina, Resinous lumps when dry
Vitreous mass conchoidial fracture,

Ductile Chemicals

Sulphuraresenate Silver ductile cake.
Mercury Phosphide may be cut with Knife
Silver Sulphide amorph wax cut with Knife
" Chloride " " "
" Bromide " " "
" Sulphide after fusion " "
Horn lead. Pb Cl I think or oxychloride after fusion —
Sulphide Molybdenum —
Sulphur in certain conditions
Gutta Percha, Rubber, Balatta, Celluloid.
Vulcanized hard rubber hot, Gelatin, glue,

Chemicals which can be drawn into threads

Mecca balsam, balm of Gilead. Drawn out in threads
Monobenzoicin Benzoate of Glycyl at 40 C can be drawn out in threads,
Metacinnamine softens heat, drawn into threads, glass like cut with knife ord temp —
Glutin, vegetable gelatin drawn into threads
Oleate Mannityl colorless waxy becomes soft tenacious gentle heat
Pasto Resin Viscid capable extended very tenacious fibres which gradually harden when heated above 100 C. Elastic like Rubber
Tetrametaphosphate Sodium precip in Alcohol ropy like Rubber. drics to transept frosted mass not ooh H_2O
Thymol absorbs NH_3 melts at 100 C can be drawn into threads
Viscin from Mistletoe waxy can be drawn out into threads
Gelatin action Cl. flakes filaments elastic
Rosin, Pitch, glass, sealing wax, gutta Percha
Rubber — Balata, many varnish resins

Chemicals that produce films

Ferric Citrate
Silicate Soda
Aqe or Apin a fat obtained in mexico by boiling a species of Coccus to battery Conote dries to elastic membrane like Collodion –
Gelatin
Albumen.
Tragacanth.
Mixture Molasses & Gelatin.
Action Chl Sulphur on Oils, Rubber.
Rubber in Benzol.
Gutta Percha in solvents.
Cellulose in Chl Zinc precip by Alcohol.
Balata in solvents.
Boiled Linseed oil.
Gelatin with sugar, molasses etc
Cellulose in Cupricammonium –
Cellulose acid and alkali & dis in CS_2 & then water Viscose
Acetocellulose

Chemicals giving tough mass.

Benzoic acid action Cl Tough gummy mass.
Dibromoacetate Lead " "
Ferricy K action H_2SO_4 certain stage Tough substance.
Platinocy K action HNO_3 no ¶ mean H_2SO_4 tenacious mass
Cumino-Eugenic Anhydride "
Furfurine Tough coherent mass.
Permolybdic Phos tenacious transpt.
Cinnamic A action Cl, tough gracey

Chemicals producing a Varnish —

Conine acetate Varnish.

Hyocholoïdic acid Resinous Na Salt in Alcohol perfectly transpt Varnish —

Sulphomolybdates. Mg Salt a Varnish, ditto Mn salt, later transparent.

Morphine acetate Varnish —

Potassic Vanadic Oxalate, amorph Varnish.

Peloxine " " transpt.

Diallylidene-diphenyl-diamine Varnish.

Phosphato-Vanadic acid "

Quinine Borate also Chlorate Varnish transpt

Quinotannic acid when mixed Gallotannic acid dries to transpt Varnish —

Rubian forms Varnish —

Shellac

Selenite of Cerium Varnish.

Vanadate Na amorph "

Shellac, Collodion, linseed oil, Elaïdin, varnish gums.

General list of amorph etc Chemicals from which preceding lists are taken.

Acetate Cadmium Gelatinous
Acetic anhydride acted on H_2SO_4 gummy
Aconitate Ag amorp
Aconitate Ca gum
Acrolein ammonia amorph.
Alcoholates. Compound with CaCl amorph
Allantoin Compound with Hg Oxide "
Allophanate Na Gelatinous
" Glycerylf "
Allylate K "
Allyl Sulfide from garlic Gelatinous
Amylamine Sulphate Gummy
Aloetic acid Amorph
Amarine Hydrochlorate transpt mass
" Nitrate amorph
" Acetate gummy
Trinitroamarine amorph
Amygdalic acid gummy
Amylate K Soapy
Amylmercaptide of Hg solid mass.
Anacardic acid some salts amorph.
Ananirtin waxy
Anchoic acid Porcelain like,
Anchusin amorph
Andaquies wax wax
Anemonic acid amorph
Angelica wax from Angelica Balsam.
Anise oil 298 Vol 1 Watts ~~from~~ gummy salt,

Anisic alcohol Cmotd by H_2SO_4 to resinous mass
Nitroanisidine Br comotd to "
Hydride Anisyl Pentachl P cmots to pitchy mass
Trichl antimony translucent fatty mass
Pentachl Sb absorbs NH_4 & Phos H. forms solid compounds
Apiin – gelatinous, vitreous after melting.
Arachis Hypogea Earthnut oil saponifies gives hard soap
Aricine neutral Sulfate gelatinous dried to horny mass
Arsenite Sb fuses to vitreous mass
Arsenate Al. Vitreous mass
Sulpharsenate Tin gummy
" ate – Ag ductile cake
Sulpharsenate Tin gummy
Ascetepione amorph
Asparatate of Mg gummy –
Athamantin heated KOH amorph sub –
Aurade Waxy mass
Azobenzoide White amorph
Azobenzidine amorph transpt
Azobenzoyl. "
Balsam Tolead, drawn out threads
Liquidamber – transpt
Beech bark amorph sub contained therein
Beachnut oil soap therefrom
Bebirine heated w Chromic A. Resin.
Benzilin melts solidifies amorph.
Benzoic Acetin Al. tough gummy mass.
Monobenzoicin Benzoate of Glycyl. at 40C transpt
drawn out in threads
Nitrobenzoylbenzoin MP 137 C solidifies amorph.
Benzoylazoticle Vitreous mass
Benzoylureid amorph
Berengelite, Berengela Resin amorph.
Betulin "
Borate lead monometa amorph glass.
" Dimeta "
" Sesquimeta "

Biborate Ethyl. transpt glass, soft and temp drawn into threads
Dibromoacetate Lead tough gummy mass.
Dibromohydrin action of NH_4 Amorph
Brucine, action Cl. Amorph flakes
Brunolic acid Pitchy
Bryoretin } Amorph see Bryonin
Hydrobryoretin }
Bucurumanga Resin Amorph
Caffelannate K "
Dechloro-camphor Wax
Camphor Resin } Amorph
Camphoramic acid } Transpt vitreous
Camphorimide Gummy transpt
Camphorin, Camphorate of Glyceryl. Viscid
Caproate Na Amorph
" K Jelly
Caramel }
Caramelane } Amorph.
Caramelene }
Carmelin
Carmufellic acid earth metal salts Gelatinous
Casein — cheese Amorp
Cellulose "
Ceropic acid Waxy mass
Cerosin " Sugar Cane
Cerotene action Cl. Resin trans
Chlorocerotic acid Gum.
Cetyl-Xanthic acid Zn Salt Glutinous.
Chelidonate Ca Amorph
Chelidonine acetate Gummy
Chenocholic acid Amorp
Chinoline action Cl Resin. oxd by Chlorate + HCl tough mass
Cholesterin action Lime Amorph fatty bodies

Cholochromic a. amorp
Choloïdic a salts Earth metals amorp
Chondrin gelatinous
Chrysammic a some salts amorph.
Chrysanisic a Co + Cu salts gelatinous
Cinchona Red amorp
Hyppurate Cinchoinine "
Cinchonine Chromate "
" Oxalurate trans mass
Cinnamein "
Cinnamene " glass
Metacinnamine highly refractive glass like substance
Cut cord temp with knife softens by heat drawn threads
Cinnamic a action Cl. tough greasy substance,
Cinnamate of Cinnyl Resinous
Nitrocinnamic Anhyd Kneadable Resin
Cinnamyl hydride action Br solid sub.
Citrate Al. gum.
" Ba mono salt. gummy mass.
" ferric salt. film
Lithia amorph limpid hard
Mg gummy
Ni film
Dipotassic amorph.
Citrate Glyceryl. yellow trans mass difficult pulverize
insol. Al Ether H_2O.
Citrate Glyceryl basic same as above melts 100 C.
Dicitromanitin Dry hard mass.
Coca wax from Cocoaine Mfg
Cocinic acid (Cocosteric a) from Cocoanut oil. porcelain
like mass.
Codeine action Cl. amorp Resin.
Colophene " "
Chlorocomenic a. neutral salts Mg Cu NH_4 amorp.

Conine oxd'd to Resinous mass also I + Br, gums
Conine Acetate Varnish —
Convolvulic a Basalt. Amorp diaphanous,
Ca Salt Amorph.
Convolvulin Trans Resin
Copaiba Resin. in Balsam there is one part amorp.
Copal resin Amorph
Corticin from bark of the Aspen Amorp
Creatine, action HNO_3 amorp
Sulphocresylic a. Pb salt, " "
Crocetin "
Crocoxanthin "
Croton oil saponified peculiar Resin
Crotonol distilled Resin.
Cubeb Camphor action HNO_3 Viscid
Cumo-sulphophenamide. Amorp
Cumino-Eugenic Anhyd Tenacious mass.
Cumylide K. Amorp Gelatinous
Curarine Horny mass.
Cyanide Cd + Cu Tenacious mass.
Cobalticyanide Ni Translucent vitreous mass conchoidal
Ammonio-Cobalticyanide Ni Amorph.
Cuprosocyanide Cu Amorp ?.
Ferrocyanide Tin + ditto Zinc Gelatinous,
Ferricyanide K action H_2SO_4 at certain stage tough sub.
Platinocyanide K action HNO_3 Jelly H_2SO_4 tenacious mass.
Cyclamin Gelatinous Amorph in H_2O Translucent, glutinous
Tricymylamine Chloroplatinate Viscous
Daphnin Pb salt Gelatinous
Delphinine Sulphate Trans mass KOH precips Gelatinous like Chumma.
Diffluan Vitreous trans
Digitasolin Amorph mass.

Doppleritc Pitch
Dragons Blood amorph acid resin
Nitrosulphuric acid Ba salt. Trans gum. ditto Ca salt.
Dyolysin amorp
Elemi Resin NH4 converts to gelatinous mass.
Erythransin amorp
Ethyl hydride "
Ethyl-selenhydrate. Hg salt. easily fused amorph.
Sulphethylate Cu gelatinous ditto Au salt.
Ethylamine hydrochlorate amorph
Bromide Vinyl-Bromo ethylene porcelain like
Ethylene oxysulphhydrate form cryst salts which at 100°C gelatinous.
Euchroate of Ag gelatinous
Eugenates Basic Pb salt. Tenacious Mg salt amorp
Eupione Caoutchouc dis in it leaves dry varnish
Euxanthate Ag gelatinous
Euxanthate of NH4 gives with cupric salts jelly
Bromeuxanthic acid amorp the salts gelatinous,
Chloreuxanthic acid salts "
Nitroeuxanthic acid salts mostly "
Fibrin "
Filicic acid amorph. Na salt amorp gummy
Filimelisi-sulphuric acid Ba salt. amorp.
Filipelosic acid "
Chlorofilipelosic acid "
Formate Tin Gelatinous
" Uranium Glutinous
Fraxin amorp
Fumarimide Trans resinous mass.
Furfurine tough coherent mass
" phosphate. gummy mass
Gallotannic a amorp after evap trans, vitreous fraible,
Br forms a resin HNO_3 amorp sub. —

Gallotannate Sb gelatinous
Fe salt. "
Garcinia Mangostana Resin Trans amorp
Gaultheriene HNO_3 forms resinous subs Cl Br
viscid subs
Gelatin acetum Cl, flakes filaments, elastic.
Geoceric acid waxy acid from liquites
Glass amorp
Apoglucic acid "
Quinovin-Sugar "
Glutin " Vegitable gelatin yellow limpid
liquid when hydrated. consistence varnish can be
drawn into threads having silky lustre
Glycerostannate Ca glass
Epichlorohydrin acetum NH_4 gummy mass
Glycocholic acid Ag salt gelatinous Na salt amorp
Nitrosacchrate of Pb gummy
Glycyrrhizin amorp
Glyoxal "
Guaiaretic acid Penlachl P. questenacious mass
Guanine amorp
Oxyguanine " gelatinous
Guanine amorp sulfate hard mass,
Haematoxylin "
Harmaline sulphite Resin
Dichloroharmine NH_4 throws down jelly
Benzo-helicin Gelatinous pulp.
Bromo-helicin amorp
Heveene from distillation rubber action Cl. a wax
Hexacroleic a amorp
Hexyl-chlorine makes viscid sub
Sulphohippuric a amorp
Cerotic a waxy
Melissic a "

Argyrescin gummy mass see under horsechestnut.
Humopic acid Amorp
Hydracrylic a Ag salt "
Hydrides of Alcoholic radicals higher series will
doubtless be found to be waxes
Ceroteine Waxy
Melissene "
Hydrocarolin after fusion amorph.
Hydrocinnamide " trans " gum
Quinhydrone in NH4 amorph mass
Ethyl-Carbohydroquinonic acid Pb salt amorp
Hyocholo'dic acid resinous Na salt in alcohol
perfectly trans varnish.
Imasatin Acetin KOH gelatinous
Inosic acid Ag salt gelatinous like Alumina.
Specuanic a. Amorp
Isethionic a K salt fibrous porcelain like.
Isodiglycol-Ethylenic a. Cu Salt Amorp
Isoprene fm rubber Ozone converts to amorp mass
Jalapic a salts are amorp ditto acid itself
Jalapin Amorp Resin
Jalapinolate Cu salt amorp - NH4 jelly Pb amorp
Lac amorph.
Acelolactate Ba gum pulverisable Cu salt amorp gummy
Sulpholactate Pb amorp
Methyl-lactate Ag " " gummy mass
Lauric acid wax Pb salt amorp Na Salt opaque jelly
Lecanoric acid Ca salt gelatinous
Diamylene-lepidine resembles paraffine.
Triphenyl leucaniline brittle non-basic resin
Leucate of NH4 amorp - Pb salt. Resin K salt soap
Isomaleic acid Pb salt amorp
Malate Al- trans gum — Ba amorp Cu gummy mass
Fe gummy Pb trans pitchy mass also amorp.

Maltha mineral tallow
Mandelic acid. melts to gum — with HCl becomes amorp
K salt. white soft easily friable soapy mass.
Ethylate of Sodium, action Sodium on Alcohol, trans
Mangostin amorp mass
Mannitic acid gummy mass Cu Salt amorph.
Margaric acid Ba salt amorph.
Marrubian amorp
Meconic a Ca salt gelatinous K neutral salt unsyst
Melanic a like lampblack.
Menthol action Sodium. Vitreous trans mass
Menyanthin amorp friable
Mercury phosphide may be cut with a knife
Chloride & Bromides Ag melted in atmos of Cl or Br give perfectly trans mass or glass, easily cut,
Methyl tellurid, nitrate trans amorp
Methyl-dithionic a Ni salt. amorp
Methylenitan "
Permolybdic phosphate tenacious trans mass
" Tartrate amorph —
Sulphomolybdates Ce salt gummy Pb. amorp
Mg Varnish Mn trans varnish
Morindin gelatinous
Morphine acetate Varnish, Cyanurate amorp
Hippurate amorp Mellitate amorp brittle.
Pyrotartrate fissured gum. Sulfate amorp.
Iodomorphine action Hg amorp Hydroiodate decomp by Ag ox amorp
Mycomelic a trans gelatinous
Myrtle wax
Myricin wax in beeswax insol al
Myristic a Pb salt amorp
" Anhydride "
Myroxocarpin trans glass Cl converts to resin

Elastic amorphous substances action
Chloride Sulphur on drying oils etc.
Tetrachloride of Dibromochloronaphthalene
if heated above MP remain soft trans, amorp
Bromotrichloronaphthalene B modification.
Wax like,
Hexachloronaphthalene wax like
Chloronaphthoic acid Pb salt gelatinous
Marignacs Trinitronaphthalic a adhesive resinous subs.
Napthionic A action HNO_3 containing Nitrous, a Resin
Napthalamine Cl forms resin
Menaphthylamine Sulphate amorp
Narcotine Sulphate Viscous, hardens gradually
Nitrialin amorp action Sulphide NH_4 on paranitraniline
Dinitrothylic acid see nitro Mg salt amorp.
Ceric oxide dis HNO_3 on evap viscid mass
Nitrate Zirconium basic salt Gelatinous
Nitrosacharose white trans friable resin in cold
but glutinous ropy at ord temp
Oil nutmegs deposits solid Camphor absorbs 11% Hcl
+ melts to transpt mass
Ocuba wax, used extensively in Brazil for candles.
Oleamide action alcohol NH_4 on oil Almonds
semi trans at 70. possibly good for phosphorus mixing
Oleate Mg Cr Al. + some other transpt amorp
Tribromo-dioleic a forms uncryst salts Ba Salt pitchy
Cod liver oil treated alcohol NH_4 forms large quantity
of amide MP 93 C Becomes solid + trans
perhaps other oils do same,
Oleate Mannitol Colorless waxy mass. soft + tenacious
at a gentle heat.
Olivil Resin trans
Onospin amorp
Opianic a NH_4 salt amorp
Sulphoopianic a - trans amorp

Opiamnione amorp
Otoba fat. Contains Otobite which when strongly heated solifies amorp
Oxalate Ammonia Amorp trans,
" Vanadium Blue gum translucent
Potassic Vanadic oxalate. amorp Varnish
Dimethoxalic a gummy mass
Diazobenzine=oxybenzamic acid action NH_4 + HCl. amorp soluble Zn Salt Amorp Cu salt ditto.
Dioxybenzamic a action Nitrous fumes Resinous mass
Oxynaphthylamine amorp powder
Oxyquinine Colorless trans mass when fused

10 Palmitic acid	90 Lauric		uncrystallized
50 "	50		"
35	65	Myristic	"
32.5	67.5	"	"
30	70	"	"
20	80	"	"

Palmitic a Pb salt amorp Ag salt highly amorp
Mannitic Palmitate solid white mass melts to wax
Palm Wax Hot Alcohol sep it into true wax + a resin
Parabenzine action H_2SO_4 forms an acid Ba salt gummy
Parellic Acid Gelatinous
Pasto-Resin viscid capable being extended in very tenacious threads which gradually harden when heated above 100 C becomes elastic like rubber
Pectin amorp Parapectin amorp
Pectic acid moist jelly dries to trans horny mass
pectates except alkaline insol H_2O Gelatinous
Pelosine amorp trans varnish
Peucedanin waxy mass from the Masterwort
Chromous Picrate amorp

Bromamidophenyl— several amorp. products
Aniline + Sulphide Carbon is converted in a few days into fatty substance.
Anilin Metaphosphate Amorp.
Cyanilide— under Azodichlorophenylamine. Resin resembles colophony perfectly
Diallylidene-diphenyl-diamine Varnish
Dibenzylidene—diphenyl-diamine Amorp. glassy
Melanilinic-hydrochlorate gum. actum Cl a resin
The Oxalate a resin
Phenyl-amyl actum Cl. Viscid mass
Under Phenyl-Benzoyl-Benzhydrolic-Succinate Trans Amy
Phloretic a actum Cl. sticky mass
Nitrophloretin Amorp.
Phlorizein Uncrystl'zd
Phlorizin Hel converts to Amorp—Cl to Resin
Phosphoramides— Amorp.
Hypophosphite Alumina thick gum when evap Vacuo dries to shiny gummy brittle mass ditto glucina salt,
Orthophosphate Al acid salt gummy fuses to glass
Metaphosphate Lead fuses to glass
Hexametaphosphate Lead precip which becomes resinous
" Magnesium precip soft + tenacious
ammonium mag phosphate dries to brittle trans mass
Metaphosphate Ag melts to glass insol H_2O
Hexametaphos Ag soft at 102. C + at higher temp melts to glass insol H_2O.
Tetrametaphosphate Na precip gummy even when diluted 100 times when precip by alcohol mass is ropy like rubber dries to trans fissured mass not hygroscopic
Phosphate Tantalic a fuses to colorless glass

Phosphate Titanium gummy
Phosphate Vanadic a. Varnish
Orthophosphates Di Zincic salt melts trans glass uns of H_2O
Phosphate Zirconium gummy transtucent mass when
dry uns of H_2O
Ethylphosphoric acid Uranic salt. amorp brittle
Physalin amorp
Picoline action Cl dazzling amorp powder
Propionate Na amorp
Prussian Blue "
Pteritannic acid "
Pyrocamphretic acid Ba + Pb amorp
Camphretic acid salts uncryst
Pyromeconate Mg amorp Ag salt gelatinous
Pyrophosphamates of NH_4 + K gummy
Pyrophosphotriamic acid amorp
Pyroracemic acid B kind amorp + gummy salts
Pyrotartaric acid Mg salt gummy very fraible mass
Pyrotartrimide dis OxPb dries to gummy mass
solution attacks filter paper renders it gelatinous + viscous
Quassin trans yellow brittle mass
Quercetamide amorp
Quercetin alcoholic sol mixed with ferric Cl. amorp mass
Quercite-Nitro amorp Resin
Quercitrin after fusion amorp --
Quinic acid "
Quinates Yttrium salt gummy ferric ditto
Quinine trihydrate resinous acetate fuses to colorless
glass Borate a varnish, Chlorates, Trans varnish
Croconates or Rhodozonate amorp Cyanurates amorp
Hydroiodate Resin, Nitrate waxy Tannate "
Valerate solidifies from solution as a glass
Hydroquinine amorp resin
Ethylquinine "
Quinine-sulphuric a solid amorp

Quinone precip with basic acetate Pb gelatinous
Quinonic acid, uncrystlbl salts.
Quinotannic acid when mixed with Gallotannic A dries to trans Varnish
Quinovin amorp resembles Gum —
Racemate of Ni gelatinous, Mg amorp when combined with alkali metal — a double salt,
Ethyl-Racemocarbonate one kind amorp trans mass
Rhamnocatharin amorp brittle
Rhamnotannic acid "
Ricinelaidic acid Ba salt unctious talky
Ricinelaidin solid fatty body action Nitrogen Per ox on Castor Oil —
Ricinoleic Acid fatty acid —— Cu salt fuses to a solid very friable Pb salt fuses to solid easily pulverized
Rosolic acid Pitch amorph.
Rubiacic acid amorp
Rubian — hard perfectly amorp resembling dried Varnish or gum arabic
Rubichloric acid Pb salt trans mass
Rufimonic acid amorp.
Rutin fuses to amorp mass
Saccharic acid Brittle. Ferrous salt gummy
Salep 1 part S converts 48 pts boiling H_2O into thick gum which becomes compact & solid on addition of Magnesia or Borax
Chlorosalicin Resinous
Salicylide fuses trans mass
Salicylic anhy hard mass
Bromosulphosalicylol Resin
Monochlorosaligenin "
Saliretin " acids sep & fm H_2O as gelatinous pulp

Salvia sage oil Nitric a converts to Resin
Sambuens soft gelatinous resin substitute Bird Lime
Santonin by prolonged fusion amorph.
Trichlorosantonin alkalis convert to Resin.
Saponin neutral Pb acetate gives gelatinous precip
Sassafrass oil H_2SO_4 forms resin
Ipomaeic acid under Sebacic A precip formed by
Ipomaeate of NH_4 + $CaCl_2$ amorph.
Seleniocyanate Hg amorp gummy mass
Selenium Tetrachloride one reaction gives sub like Wax
Stearate Ni — Mn + Lithia transparent + amorphous.
Selenite of Al. trans gummy Cerium salt. Varnish
Aq opaque Zinc acid salt. trans gummy fissured mass.
Myristin silky aspect fm Beeswax
Shellac Varnish
Silicate Na K tough skins
Silicofluorides. Hg salt trans gummy mass
Silver Sulphide amorp wax cut with Knife
ditto Chloride
Artificial Aq Sulphide after fusion soft enough cut Knife
Sinaemine? resin
Sinapic acid. easily forms sol salts in alkalis
Sulphocyanate Sinapine melts gummy
Solanicine amorp
Solanidine Sulfate "
Solanine sol in acids septd by alkalis gelatinous
precip melts + solidfs to amorp with Nitric Resinous
salts of Solanine dis in Alcohol. gelatinous Mass
Gallate " amorp
Solanine heated sealed tubs with ethylic Iodide salts gummy
Oxalate amorp
Suberate Al. amorp powder
Succinate Pb basic salt sticky glutinous brittle on cooling

Greenscum from Sugar Cane has wax called Cerosic
Sulpho-Benzamic a amorph
Sulpho-Camphoric a Pb salt, Amorp Ba gummy
Xanthate Ca gummy
Sulpho Cinnamic acid Ag salt Amorph
Sulphoglutinic acid action Sulanhyd. on excess Naphthalene glutinous.
Sulpho Melanurenic acid Sr salt large plates waxy lustre
Sulpho Naphthalene MP 70 solidfies Trans, Elec friction
Methyl-sulphurous basic Pb salt white amorph
Tetrachloronaphthylsulphurous acid.
K salt gelatinous,
Ethylene Sulphurous acid Pb salt tough gummy
Naphthylene Sulphite Ba Salt Amorp
Phenylene-Sulphurous acid Ba salt amorp
Sulphate acetic oxide gummy mass
Sulphate Alumina tetra-basic-salt. trans vitreous fracture trans jelly when wet
Manganic Sulphate perfectly amorp powder
Sulphate Tellurium to trans vitreous mass
Vanadous Sulfate basic salt dries to blue trans mass
Amyl Sulphates generally uncrystble + soapy to touch
Amyl Sulfate NH_4 gelatinous Ca soft to touch
Hg cryst nodules soapy + glutinous
Ethyl-sulphuric acid Al salt gummy
Sycocerylic Alcohol after being strongly heated solidifies to a transparent glass.
Sycoretin amorp
Sylvic acid Melts glassy mass Pb Salt amorp easily fusible Mg salt trans resin.
Sylvinolic a amorp
Common Lilac leaves have a wax extracted by Ether
Tannaspidic acid amorp

Rufitannic acid amorph
Tartrate Pb gelatinous Mass Na salt gummy
Al- gummy non deliquescent acid tartrate K
dissolves alumina forms amorp mass Boro potassic
tartrate white amorph mas
Melatartaric acid trans gummy mass
Glyco-tartaric acid black amorp mass
Diacetotartaric acid trans gummy mass
Aceto tartaric Ether action Sodium give trans gummy sub
Amyl tartaric a trans amorp Mass
Tellurous Acid Cd salt gelatinous dries brittle mass
Pb salt melts translucent mass K salt soft
gummy Coagulum —
Terebanic acid Ba Salt a gum —
Terebenetillic acid Pb salt resembles gum Arabic
Chl Thallium cryst flexible mass
Theobromine dis barytic water to white jelly
Thianisoic solidifies amorp state Basic Pb salt amorp
Thymol. absorbs NH_4 hard brittle mass at 100 C. can
be drawn into threads
Thymotic acid white loosely coherent mass silky
lustre MP 120 expands + solifies
Stannic a gelatinous dries hard translucent lumps like
gum Arabic NH_4 salt gelatinous
Metastannate K gelatinous
Tungstate Al acid salt cindy resinous lumps when dry
Metatungstic a Colloidal — glutinous, sticky gummy
some metatungstates are amorp + gummy Al salt
amorp Ferric " Ag salt waxy crusts
Tungstic Sulphide combines with Ba Ca Sr + Mg sulfides
to form amorp masses,
Nitrotyrosine — Ba salt amorph
Urate NH_4 acid salt "
Valerate K "
Veratrol K salt gelatinous Al acts to make unctious

Viscin glutinous from Mistletoe pure viscin is waxy
may be drawn out in threads
Age or Apin a fat obtained Mexico boiling species
Coccus butterey consistency dries to adhesive membrane
like Collodion.
Muconic acid most of salts amorp.
Sulphomolybdates amorp gummy

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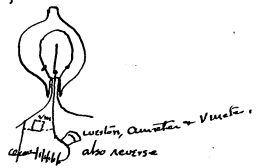
It is probable that if gelatin film flowed over polished nickel plate or Pt and then when nearly dry another plate laid over it & connected to battery that one surface would be oxdzd so it would be insoluable water & thus keep its transparency possibly gelatin films when practically dry could be oxidized & rendered insol in H_2O by H_2O_2ox, $PerO_2$ Na. Peroxchl. $PerOxNit$ Hypochlorite Mg of Na, etc. The idea is to make insol gelatin plates for photo etc, possibly oxdtn assisted by light from arc,

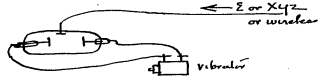
If a vacuum bulb input across 100 volt ckt and also several microfarad capacity of condenser it seem to me that it will discharge into vacuum tube & give alternating current therein (10) convert continuous into alternating

With center wire in incandescent lamp try connecting the wire circuit (10) wire in center + P pole with battery and resistance to oppose & add to the extra current & notice phenomena

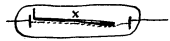


If Ni + Fe pocket be put into sealed glass tube with platinia conducting wire + small quantity NH_4 in H_2O be put in + tube heated till whole evaporated shewed be able charge + disch battery.

Of the many viscous transparent substances should be able to get a material that Daly can blow a small globe + put a filament in also Vacuum tube other than glass.

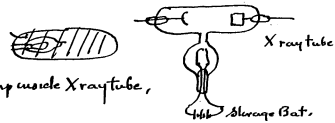


Exhausted to very best vac where light is very easily deflected by Mag — The stress coming in over wire moves the stream sidewise.

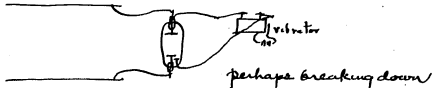


Vac tube chalked glass X

the line of charge illuminates chalk, put magnet top so line of illumination moved perhaps used as telegh receiver cables.



See effect lamp inside Xraytube,



the resistance of a vac tube at most sensitive point by a small spark coil then stopping that 100 V current will keep it up - or with aid of several microfd condens

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It will depend somewhat on the nature of the residual gas. Hittdorf in one expt got with 100 Volts in tube where 1200 V wouldn't start tube, started it with Leyden jar, there must be a dissassociation of molecules before conduction; Hows H_2O Vapor — One electrode should be so the residual should be able to chemically combine + the disaccociate. Perhaps MnO_2 PbO_2, N_2O_3 — possibly Oxygen residual or H_2O + Electrodes that would form a storage battery.

In wireless telegphy think that if atteneau point is heated white hot it would connect with the medium better just as the p pole in Vac tube shows great fall potential or Res. + scarcely any if white hot, a Nernst Lamp at end wires might answer, or arc or platina wire — or X ray focused on it or Radium

On Molograph using Carb Strontia make lots of cylinders + test with various solutions instead of KOH. Try NaOH LiOH. BaOH, Sr OH, CaOH, NH_4 — Chlorides Lithia + Ca Soap Solutions Meconate K uncrystalizable Silicate Na. Precip ferrocn in pores Quinonic acid uncrystalizable salts. Chloride Zinc, ChMg — Key KI. BrK — ChCupric, Hgcl. KOH saturated Zn OH, ditto CdOH, KManganate KPlumbate KPermanganate, K or Na Tungstate KPhos, ~~KCrom~~ look up very deliquescent salts with Alkaline bases, see p 123

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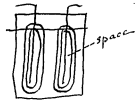
Concentration Storage batty KOH say 30% sol finely divided Magnesia ignited or ~~infusorial earth~~ zno + graphite both poles 3+5 in grids — charge + get current due to Cnctn Cell might be made with nickel sheets faced with a porous non conductor

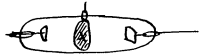


possibly a 28 plate cell in which is crowded 300 plates with porous material packed in by pressure & cubole wet with KOH. provision possibly for gassing – Carb Strontia, used for porous material, possibly plaster Paris could be used, possibly Orch Zn or Mg – or Portland Cement, phos Zinc,
2000 plates 10/1000 thick with 10/1000 porous material weight plates 280 Lb put in 5 cells in series gives one volt, 200 watts,

Both Cd & Mg (OH) form higher oxides with Peroxide H, Try both 5 & 5 grs to in KOH, see if its possible raise to higher oxide

Peroxide of Copper is obtained by Heating Cupric hydrate in KOH — Try Lelande,

If we are to consider a solvent like water a Vacuum Electrolytically and as X ray is only produced at a certain stage of exhaustion in Vac tubes & ceases beyond That point & below it Then with a celluloid Cell & platina Electrodes & very few ions should get X in some form or X42 from one of the Electrodes



X is mica as the thinnist kind of matter throws a shadow when X ray stage is reached.
vide Crooks Will Pt get hot or give X ray if it does the bombardment is a secondary action – if it doesnt the the Ray must be produced by bombardment & production of a temperature beyond anything that Can be produced in arc, or if not it must be the joint action of the atom & the inertia of the Pt atom disturbing the medium

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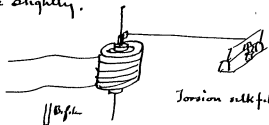
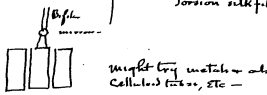
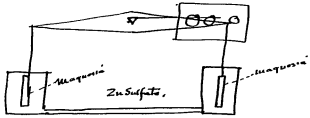
The Positive pole current seems under all conditions to carry matter forward with the Current.
Therefore if it acts at any distance, the Cylinder should rotate slightly.

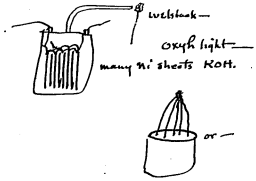




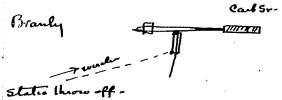
Condenser

X hard pressed Carbonate Strontia wet KOH. Ni sheet, test points on Metogh rose if Ni OK if not can plate a metal that is —



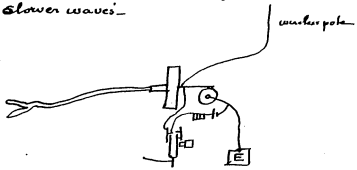


Feby 8 1903.



Why with chemical recording pens is marks on Oxygen side always tailed off + on Hydrogen side sharp, run it down might get lot Phenomena out of it.

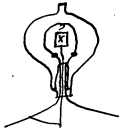
Is it true that if combustions take place at very low temp you produce Elec, just as if low temp produced slower waves -



Use motograph high pitch fork make 4000 waves second, if on Cable. Everything that Comes will be broken up into sound + the dots + dashes will give variations detectable where Syphon Recds might not show a break in say ----

Try 212 °fah Fusible metal in Phono Record mould. possibly Cements put in mould might contract enough to come out say Plaster P. Phos Zinc Oxychloride Zn Mg Gelatin. with backing of Sugar Very hard Coal tar pitch.

Possibly some of the many Camphors less volatile than Reg Camphor might answer for Phono Recording



Possibly with very high Vac get X ray from X - there is bombardment Could watch for it as Exhaustion went on.

Ouillotogh use salts etc KOH etc with different liquids, glycerine amyl + other alcohols, Pyridin, etc, Hydrocarbons with Ozone in —

Possibly as substitute for $Ni(OH)_2$ in battery compound hydroxides might be used, say Cr Fe Mn Fe Wo Fe Fe Bi Mo Fe Cr Mn Cr Wo Cr Mo Cr B. Co Fe. Ni Wo Ni Fe Ni Mn Ni Mo Ni Bi Ni Mn Cr Ni
Fe Ce Co Ce Bi Ce Mn Ce Wo Ce Mo Ce Ni Ce all hydroxides lowest members and precip together in various proportions.

Celluloid Cell – two Electrodes fluorescent liquid in water with say Uranine in very little, very dark room eyes sensitive use strong current possibly phosphor; try various liquids — Electrolytic + mentator, possibly in depositing Zinc the anode might faintly phosphoresce, also depositing Z on Magnesium plate, Or two mg electrodes in KOH might phosphoresce when ion strikes the oxide skin on Mag possibly liquid if warmed would better, also try cold —

If one smells chlorine for a few minutes, then for hours afterwards cigars smoke smells as if the tobacco was scented with Cascarilla bark —

Try further experts on oxdzg flesh by HNO_3 + dissolving product of oxdtn by Iso-butylamine — see rapidly. Would be fine for bloodless surgical operations

Why do the dried compound of Molybdate of Tri jump several feet when placed in the hand,

Chloral Hydrate is a good solvent, its peculiar, = it dissolves cork – possibly might be used in Electrolytic Experts also Phono work for dissolving amorph materials —

I noticed somewhere some phosphoric acid forms a phosphide with Copper pole electrolytically. This or phosphorous acid might with proper metals form a storage cell—

It would be interesting to determine the velocities of Chemical reaction. by revolving a cylinder at great Velocity + then drop a chemtelgh pen down having a pointer on your to give speed— Before for the pen perhaps chem paper strip or better. or a gravity drop the inch of paper being moved up or down the heighth of the fall—

Depolarizers Battery

Peroxide of Acetyl— when dry powerful explosive, ditto oxidizer possibly good depolarizer easily made by dissolving Acetic Anhydride in pure ether, + adding equivilent quantity Ba Peroxide. See "Oxygen" Watts Vol 1 35—

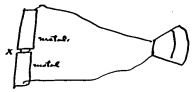
Peroxide Benzoyl of
The anhydrides of Dibasic acids heated with BaO_2 form easily decomposable peroxides for instance Succinic anhydride See "Oxygen" 319 Watts

Oxynaphalamine easily made by dissolving Hydrochlorate of Naphthalamine in Alcohol solution diluted but not enough to produce turbidity while whole is stirred aqueous Ferric Chloride drop by drop added until slight excess whole allowed stand one hour repeatedly stirring precip then collected + washed until Nt aq gives no precip then washed Alcohol + dried in Vacuo Amorphous + light purple, when moist smells of or like Iodine Does not combine with acids or Alkalis Sol of KOH. might do in defaulde possibly sub for Nickel in Ni Fe Storage

Oxysulphides
Oxychlorides } Depolarizers

Feby 8 1903

Magnesium acted on by Hydrogen Peroxide forms a strong alkaline solution. ?



X between, all heated, phos + X ray crysts between heat stresses crystal to a certain point then discharges + restressed give continuous Leyden jar idea — pyroelectric Crysts.

Oxalate of Iron Electric by friction —

Di-strontium ortho Phosphate by precipt Sr salt by Di Sodium phos + heating precipt to incipient fusion. is Phosphorescent,

Try subliming chemicals in partial Vac Tubes in strong field magnet ditto static field, X ray —
Some sublimes Bichloride Arsenic + arsenious oxides
Carbon Hexachloride Camphor, Iodine Am Chloride
Anthracene + many organic,

Gallotannic Acid Yellow when exposd Light
" Amorphous.

Crystals of Tartaric Acid become luminous when rubbed in the dark ——

Aluminum Potassium Tartrate Amorph, dissolves Considerable excess of Alumina

Hydrated Silica from NaSi by HCl dries in Vac H_2SO_4 drans glass with 23% H_2O —

Feby 8 1907

Material useful for experimenting which can be turned or bored.

Slate Steatite Meerschaum. Cryolite
Marble Gypsum Mica Hard Rubber
Celluloid Vulcanized Fibre Horn Button stock
Glue with powders. Bone, Ivory, Wood.
Lava, Pumice Gutta Percha, Plaster Paris
Coral, Magnesium limestone Oxychloride Magnesia
Oxychl Zinc Phos Zinc Fused Chloride Silver
Sulphide Silver, Oxychl Pb, Horn Lead.
Sulphur, Acid Soaps, Shellac with powders,
Albumen with powders. Hydraulic Pressed Carb Strontia
with Cinders, Vulcanite

Feby 8 1903

Flexible sheets, films —

Mica Gutta Percha Balata, Iceland moss dissolved, Hard Rubber soft rubber, rubber in Benzol. Celluloid Glue, Gelatin, Gelatin with sugar, Gums with gelatin, Collodion Vulcanized fibre, parchment animal, parchment paper, paper dissolved in Cupric Ammonium, Cotton dis in ZnCl precip by Alcohol Tragacanth films, Silicate soda, Oiled Silk — Linseed attacked by SCl. Carbonized paper, Reduced Collodion Carbonized, Leather fish glue films Oleate Lead, Sulphurized Asphalt, Birch bark — Lace wood, Certain Sea weeds. Tracing cloth, Iceland moss jelly dried, Sulphide Molybdenum — Rind of Cactus. Pears soap in alcohol dip — Cold glass gives thin film flexible.

Viscose — Acetocellulose, Casein

Reducing Agents

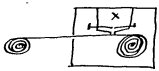
Sugar. Hydroquinone. Ferrous Sulphate Ekonigen,
Pyrogallic acid, Sodium Sodium amalgam,
Zinc dust, Zinc, Al Mg— Hydrazine, Formaldehyde
Hydroxylamine, Phosphorous, PhosHydrogen,
Hydrogen. Iron+HCl. Stannous Chloride.
Aldehydes, Albumen, Gelatin Ammonium Sulphide.
Glucose, Hypophosphorous acid, Sulphites, Hyposulfites

Oxidging agents.
Hypochlorite Na etc, Permanganate K Ferridcyanide K.
Peroxide K. Peroxide hydrogen Ozone, Nitrogen Peroxide,
Nitric acid, Chromic acid Ferric Chloride, Peroxide Silver
Oxide Silver Peroxide Lead, Persulphuric acid, Perox Manganese
Peroxide Cobalt, Bromine + Chlorine in water, Na Peroxide,
~~Ozone~~

Will a jump spark passed continuously thro a gas flame raise the luminosity ditto with Welsbach on.

Decompose acetate or formate Nickel in vacuo by heat absorb the acid by a solid reagent leaving Metallic Nickel possibly in a condition that it will be active in Battery. Hypophosphite Ni goes to metal at 100.C.

New Recorder idea

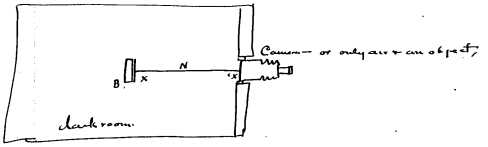


Band of paper coated Balmains phosphorescing material Box X containing sparking point Source of current say Vacc tube etc or any source light, Ethric, Hertz small opening below points, paper closes hole flatten say 1/16 of dots + dashes of light are made recorded by phosphorescin will last long enough to read — all to be in dark room — could record in this manner any instrument throwing beam light by mirror, of phos is rapid enough Could have Constant arc light + a magnet or Motogh Controll shutter + get record at great speed afterwards read or photo

Possibly the proximity of different materials to sparking points will give off an invisible ray that Could not be photographed that will Control spark like Ultra Violet light, also electrified body which is discharged by X ray + Radium — might be discharged by rays from diff chems The shades could be used but probably better use materials from the Gothics. Off boys could make the test, Controlling by arc + Ultra Violet.

Feby 13 1903

In some of the tests with the slides it may be necessary to remove the mica as it may entirely absorb some ray I am looking for Otto boys could do it,



B a photo slide with Dry plate X a polished Silver plate. N Copper rod 1/4 X polished silver plate, Use X ray arc etc, Idea being light may cause transmission of a ray thro the plate, Condensing in wire & expanding on X & be photo'd, give say 10 hours time,

On principle of Nernst lamp it may be a good thermo could be got from a conducting Sulphide in an atmosphere of sulphur under pressure & permitting a high temperature to be attained without final decomposition of the sulphide a limiting point being reached, This might hold good for Oxides in Oxygen etc & will be true of any hot conducting body and as many bodies become conducting on fusion & those which are prone to decomposition & in fact must decompose will recombine & thus chemical action Energy or E will be cancelled out & will get a true thermo Current without deterioration with proper Chemicals & Electrodes there is a wide field for experiment.

Feby 13 1903

With an X ray tube after use for a few moments + then disconnected quiz off a ray to a photo plate, Could arrange it with heavy lead shutter so tube be excited while plate screened + then Exposed when not excited, by rotating the shutter Could keep it up for some time,

Have Old boys break off pieces of the Granite Gneiss etc samples + powder + make up a slide or so also collect from gravel bank off phono works every kind of pebble + make slide also sand, also all the rare Alkaloids in that sample case,

Possibly plain glass, Celluloid, Mica, polished hard rubber, plates would act in place of a photo dry plate, The light Electrifying or changing surface so if put in Vacuo or Even in air troublined Chemicals allowed to come in contact with it they would adhere only where the light struck or the Contrary Possibly some liquids or the Vapors there of Condense Possibly polished plates with dif metal surfaces might be sensitive to Vapors Cl I Hg. S. Te S NH4 possibly plates coated with different Compounds might be physically altered so to attract particle like ClNH4 smoke etc,
Metallic plates might be enclosed in a tight box about size of slide used for dry plate + closed + Containing gases like Cl, CO_2 etc + in Conjunction with light give an image possibly developers might be necessary Quartz lenses may be necessary or no lenses at all - using an object to Cast a shadow Even polished plates Could be laid on slides with + without mica Covers over Chems -

Feby 13 1903

Possibly in dark room a polished plate could be made one pole of a silent discharge + picture thro Quartz lenses thrown on P. thro would silent silent dis at places where Ultra struck a Etch or alter the surface. Coil could be so weakened that no discharge takes place until Violet light comes.

Will X ray effect a very sensitive Hy thermometer or an air thermo filled with Chlorine + water index Cl absorbing X ray should Expand

Hydroxylamine seems to be the most powerful reducer possibly dry plates of different materials which not developable by ordinary developers might develope with Hydroxylamine Especially if warm —

Possibly all metals are compounds with other Elements or with themselves, except Fe Ni Co, and are connected to the Ether whereas Fe Ni Co are free or Centra, Is it true that all metals in high Vacuo will give various colored films by transmitted light whereas Fe is black + possibly Co Ni — try Gold, Better look films of all metals if the magnetic metals prove to be the only ones that are black it would be a great scientific fact,

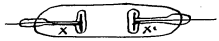
Try depositing films in Vacuo in magnetic field, X ray static, Cold Oil, + heated bulb,

If Iron Dynamo with Fe field + Fe armature gives E what would a Bismuth Dynamo give — XYZ?

If a wire is wound on a Bismuth ring will the Kick be with opposite direction to that given by iron — if strong etc might be good for Lighting Cables telefony Etc,

Think an Electrolytic Condenser could be made that would Cancel out one alternation & give a ragged straight Current, Al foil & paper moistened with acid — or KOH, also other metals & solutions, possibly Linseed oil, rosin, which are acids

Probably if one Current from an Induction coil is cancelled out or a 2000 Volt battery used & Connected to Vac tube — that it will be found that one Current tears off all metals & deposits them as films & that the same Current will not tear off Neg ion Non metals like Te S. Se Ar I Etc but that the other Current will do so & deposit films — possibly alloys of Non metals with Al will answer as Al does not deposit,

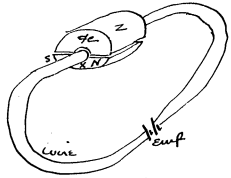


X Electrods with metal disk Coated entirely with say shellac Rosin, Gutta Percha made long glass inside so heat of sealing in will not affect shellac See phenom — Then make disks of Cu Coated with CuO, & dif metals Coated & not Coated —

Feby 13 1903

Substitute non metallic Elements for non corrosive get Kick also form ring 1/2 of metallic other 1/2 non metallic element, for instance, Te Cu Se Ag Ar Cu Etc get Kick — see phenom

A Carbon dissolves in yellow hot iron — as Zinc also amalgamates both in Hydrogen, make several Couples [C|Fe] [C|Fe] in H see if get Current due to Cementation, also [C|Fe]



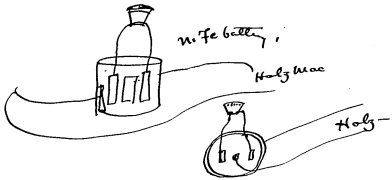
If X in position shown gives N.S. take it away leave Z what polarity will it have
Does the ethric pressure lines converge to the Center of every circuit + not outwardly

A good commercial generator of Oxyhydrogen gas could be made by using say 50 slightly Corrugated 10/1000 Ni plated steel plates, Hydrogen welded & packed with separators in Auto cell, with 20% KOH & a large Dary — a tube leading to a Wellsback or Zirconia cylinder — Could be worked by a storage Batty.

Possibly two glass plates warm with warm Conc sol of chemical on one + the two pressed together + cooked will crystalize, try crystalizing while electrically chg'd — X ray — Mag field — Violet also 1/2 of film on one side of one chem other 1/2 another which by diffusion act to form crystals, put under same conditions + watch for phenom —

Possibly a glass plate coated thinly with AgCl or better first in atmosphere of Chlorine will give transparent film AgCl. over this flow gelatin very thin, then use as dry plate should get sharp image —

Will phosphorescence last longer in Vacuo than air — Use 2 bulbs one a Vac



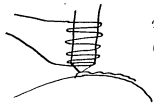
See if Electrification attract ions to one side or alter Electro Emf or C.

Better put say 50 slides on table at once with arc bore hole in Carbons + put different chems in to get strong mono etc, + so on thro all for each particular powder in arc, also opaque + use slides as fluorescency, also Dry plate,

Feby 13 1903 —

Try Experts on 6th sense 2 persons in series with battery, coil-etc, static, + magnetic,

Possibly a Capillary tube with thick Rhusto film dope connected to diaphm could be vibrated to deposit film on a cylinder + record
Possibly a partially dried film on a cylinder recorded could be made by displacement.
Possibly film dope could take up a lot of Oleate or Oleonate aluminum do Mg Chloral Hydrate Camphor Soaps Waxes etc + a good recording material obtained,



Possibly wax in tube kept hot by platinum wire could deposit + chill on a record cylinder.

Use different metals in different solutions as Electrodes and with thin Quartz window + shutter revolving fast enough to give musical note, let beam of light pass into cell + impinge on cell, to set up a current using telephone for receiver, could use plates coated with Sensitive materials, affected by light, also pass current through cell + have light affect surface + Rec,

Possibly Mn_2O_3 anhy or Co_2O_3 anhy w Pot do for telephone powder,

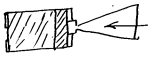
Distilling in high Vacuo of chemicals + metals, Cd Zn Sb Ar Mg Mg Se Te. easily distilled. Bi Pb Sn with difficulty - Metaphosphoric acid better than Phosphoric better sublimes at 50.C.

to get things pure should be more than one distillation, account of vac distilling in m Ann Phy Chem. [2] 18, 317 325 – Schuller, uses mechanical pumps

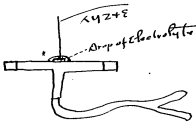
Aluminum Palmitate basic, has peculiar properties its used to thicken easily fusible lubricating oils, also thickens Ethereal oils

PbO_2 prepared by mixing Cone Solution of Pb(Acetate) at 60 @ 70 cent with Solution Ordinary Hypo is perfectly black thus should be good for Lehmann

April 4 1903. entered from small book



Try the gelatin KOH phenolphtalein test for sound waves see if there isn't an advance of KOH into other jelly by sound waves alone.



Will the spectra be different if Ultra Violet light from arc lamp shines on a sparking point, try on & off.

April 4 1903

Things to try for hard phono record that can be melted + worked by dipping process, Bases to manipulate,
Hard Asphalt something to lower MP shellac etc.
Very Hard Scotch Blast furnace Pitch possibly more lamp black
Shellac
A Rosin soap of non alkaline metal, that can be melted
Caramel + higher
Residue from distilling Sterine Pitch,

How would wet clay cylinders recorded moist also Colloids answer — Try Carb Stronti, also colloids nearly Dry — Silica — Ferric hydrox Trihydrate Alumina. could plaster over a surface 1/16 thick with Colloid —

It is possible a very good concentration cell could be made by Alkaline Electrolyte + Cu_2O both sides.

Possibly photographs could be taken by red + yellow light of light passed through a vacuum or a magnetic field or strong dielectric field or the plate under these conditions of light might pass thro a coil of wire with great amperage momentarily from short circ storage cells — or at right angles to X ray or thro a space strong of radiant heat. in line + at right angles also plate heated up to 212 — + combinations of above —

Will X ray affect a thermo coil or when heated one end or affect the current from a couple by absorption of the ray at heated or cold juncture.

Try best thermo in very high Vacuo.

Can it be that the mass of a Zinc Electrode will affect Voltage or amperage —

~~[illegible]~~ April 4 1903

Every magnetic circuit & coil has its natural charge & discharge time. If there were several such rings with their coils around them all in the line & on each ring a larger coil with Resonator or fork in tune with the Extra Coil & fork magnet it would be a good acoustic relay — possibly each coil could be a primary & short around it to fork magnet & Each coil have a different disch'g time.

Will X ray passing thro a sheet of iron within a coil give a Kick on galv if worked by a lead or Pt shutter, or be heard in a telephone.

Is Rocksalt plate affected in its heat, Ultra Violet, Ele by Electric Stress, Magnetism, X Ray or monochromatic Light.

If Radium is the fluorescer of an unknown ray which prevades the universe would it lose its fluorescence if placed in a box of Lead say one foot thick —

Since a Nernst solid oxide becomes a conductor at red heat without melting why may not a battery be made with solid Electrolytes & other applications.

Conveyors — Think it would be great improvement in conveyor belts if steel wires put between plys to prevent stretching. The belt would not need be so thick, — about 1/16 apart 1/20.

Can attraction be detected between an acid forming metal or an anhydride and a basic metal.

With a Quartz prism & arc light might try all oxides, in Ultra Red & see if any fluoresci also Iodine in Bisulfide Carbon.

~~[illegible]~~ 03 April 4 1903

It is possible that paper treated with ammonical Copper solution or ZnCl would remain unaffected in KOH of battery.
Cellulose dissolved in $Cu(NH_4)$ solution solidifies to semi trans Brittle glass This bulkhouse may be just the thing possibly other ingredients (?) MgO etc could be incorporated & be solid — KOH

There is certainly merit in the Ceric oxides as depolarizer if they can be got active in alkaline Storage battery.
They do not give enough — April 1, 1912 have got them active

Amorphous precipitates generally cause absorption of heat but those which after being precipitated amorph turn Crystalline give off heat, one about equals the other Perhaps X ray tends to make Crystalline salts amorphous as they change from one to the other very easily so a very little agitation or vibration would likely bring about the result; Sr Carb is precipitated amorph absorbing 400 Cal then it changes to Crystalline giving off 400 Cal. Could it be that this has anything to do with the metagraph action The two best are $CaCO_3$ + $SrCO_3$ both change to Crystalline after precipitn May be current vibrates the $SrCO_3$ from Amorph to Crystalline. & to this that changes the friction, there are numerous salts that have this property.
S etc Citrate of Sr HgI Ca Citrate, Cd Citrate
Dichloroaldehyde Watts 1st Sup 76 —

Neutral Quinine has the power of causing subsidence of finely divided particles in water such as India ink, Charcoal. Cinnabar, fuller earth, ground part of plants, these floating in the water move about & do not subside — by adding neutral solution Quinine Even in small quantity they subside — Alum does the same thing but more powerfully — wonder if Quinine or Alum subside the $Ni(OH)_2$ at Betty works.

Lead Citrate precipitated from Na salts by excess Pb Nitrate melts in boiling liquid to a kneadable substance,

Rosin soaps sol alcohol + amorph — also Rosin soap of Mg Al etc sol in alcohol — must be neutral, it probably some good results for matter records could be obtained from them —

Rosin in warm alcohol treated with Na amalgam forms a white hydroabietic acid which melts at 160.C & and forms salts —

Why cant a storage battery be made with PbO dissolved in KOH + then nickel plated steel plates used to deposit lead on one side Perox on other only depositing 1 to 2/1000 of inch on each surface + get capacity by using an enormous number of plates in cell — perhaps PbO_2 well dissolve in the KOH,

Perhaps hot solution of saturated salts allowed to cool + crystallize — in powerful X ray field might afterwards fluoresce — ditto Ether stress, Mag field, Ultra Violet lt,

When boiling solution of Nitrates of Na + K are mixed with ferrocyanide K + the mother liquid after the greatest part of the Nit of K has crystallized out is then left to evap gradually give light yellow hard crystals, when exposed to light for some time turn green. on the surface — then if they are shaken or rubbed in the dark shine with a faint greenish light. They detonate at a high temp almost as strongly as gunpowder, they also decrepitate Its only a mixture so in making use various proportions Possibly good X ray or other fluoresce; Jnl Pr Chem XCVII 502 Martino

Ferricy K decomposed by light Cu Oplate. Cu spongy plate.
Sol of ferri K action Light decomp + O oxidizes Cu battery.

Saw abatement in Watts All heavy atomic wt metals of heavy density compared with those of light density + atomic wt oxidize with great difficulty. + these are more easily decomposed. This matches my displacement of ether theory —

Solvent Power glycerine Parts by wt.

20 arsenous acid	7 Mercuric Chl
20 arsenic	20 lead acetate
10 Benzoic a	50 K arsenate
10 Boracic	25 Br K
15 Oxalic	32 KCy
50 Tannic	40 KI
40 alum	50 Na Arsenate
20 Cad Nitry	60 Borax
20 Chl "	98 Carb Na
10 Bacl	20 Nachlorate
27 Hg Cy	50 Urea
10 Cupric acetate	50 Zn Cl
30 " sulfate	40 Zn I
	35 Zn Sulfate.

Sulphur dissolved in CS changed by light from amorph to Crystalline + precipitates. by X ray — Mag field etc moving field, stress,

Permanganate K is sensitive test for Organic matter — Kott.

For Phonogr record masters try fine precipitates which dry powdery by putting them in very thin soap solutions say. Pears or alcohol make thick mush by dipping there will probably be enough oil in mud oil to record also try water polishing viscous etc, also resins in alcohol + amorph substances in the book dissolved in various solvents possibly amorph precips dry could be moist with thin soap solution + well mixed with minimum amount of binder as in big matter + then whole pressed into a taper mould + shoved out + baked dry This is a good field as the record would have no spaces being either soap or precip — yet the quick process of precip would make it cut dry + powdery + easy — over

perhaps trihydrate of Al perfectly washed, silica etc would make work with Pearce soap in Alcohol, also form hydrox
$SrCo_3$ recently precip. Prussian blue in Alcohol perhaps something very much softer than Sodium soap would be preferable an oleate or a K soap – Ceresin

How would pressed amorph graphite cylinders do for phono recording – graphite purified by Jewett process

Since we have CP KOH, try Zn & CuO + see if Copper dissolves in KOH.

Try precipitated Arsenates for Mutograph they are amorph – by heating for sometime to 100. C. they become crystalline,

A Mutograph with cylinders highly buffed + metal pens of all metals, cylinders ditto + all metallically conducting compounds showed get some phenomenon at the points of contact,

See if Regular Mutograph action is increased or diminished by heat, try Condensers so no constant current passes. Try constant current excitation + then use telephone see if it works by varying a constant current, try current both directions see which works best. Use on Mutogr $SrCo_3$ then polish then wet with a solution not attacking $SrCo_3$ then with another solution that forms a precip in the pores, dry + do it again until get very near solid, see if it increases action possibly Sr Hydroxide will do it + putting air containing CO_2 get it to absorb to saturation drying between each wetting then finally moisten with Carb K this precips $SrCo_3$ + wash KOH for washing – Was Carb Lithia tried for a phono-Mutogr cylinder ——

April 4 1903

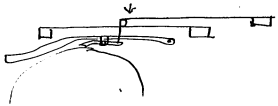
Think that Higham's phone device will work without leverage by running power cylinder high velocity & using a pad of a very bad Conductor of heat, – Rosin or analogous material for a power Cylinder The pressure heats the Rosin & this causes sticky friction greater than sequen Coefficient.

Perhaps a Molograph cylinder quite large would hold enough water to permit of working a week without wetting It might be wet with a wick brot up to the side by push button from outside try the wet sponge & closed Chamber this Rott should absorb it. try & lay aside & see how long it last testing from time to time

Possibly fusible metal 212 MP or less can be used as a phone cylinder for recording after burnishing to destroy Crystalline structure & heating up to the proper softening point for recording —

Oxide Mg Cylinder Record then wet with Conc MgCl
ditto phosacid or ZnO ditto ZnO + ZnCl.

Try 2" diaphrm for recording & put on a tightener that will tighten it nearly to limits of Elasticity. then have recording point do rest. defect heretofore that weight did not tighten enough.



April 4 1903

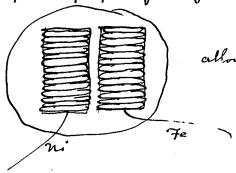
Sulphur is a good base to work with for making hard phono Records. it works nice & dont seem to hurt record. Melts about 250 Fahr. is very limpid like water & takes very fine impressions. the surface is glassy and very hard. It actually alloys with Naphthalene. this shows that there are probably many substances which can be alloyed with it, ahead. the S attack Cu on Cylinders after. Can wash off. could use a little nickel next to gold & back of Cu the Ni will be ok. Its extremely cheap & light spec. gravity — The fibres of Cotton will work in it. Try all combinations —

Storage Bat KOH is Mono has one hydroxyl whereas Ba has 2 hydroxyls or OH ions hence 2% of Ba equals nearly 4% KOH perhaps by overcharging Ba OH could be concentrated inside & thus get more OH inside than by KOH. think ahead try it again alone without KOH see what Can be done

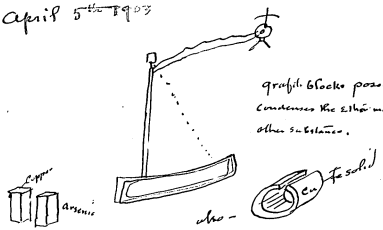
Try Storage battery with considerable Zn hydroxide dissolved in the KOH, possibly the Zn Ion will act to reduce the FeO & thus stop loss by concentration effects

Ammonia NH_4OH. try various quantities Ammonia in KOH with battery & make Curves — also solely a BaOH solution with various amounts of Ammonia —

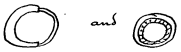
Have Fred OH make some packets with old smooth die or get some of new pkts from Glen ridge & pack face to face & test.



April 5th 1903



2 substances one condensing the Ether the other displacing the 2
try various metals + non metals acids ~~amalgams~~ in Tubes etc
at right angles + otherwise also try all the metals in U shape
for kick when magnetized by very strong coil –
also closed rings of cu Ether Condensing + displacer wound with coil
get kick also



also 2 metals one of which displaces Ether less than the other
Cu Pb – etc

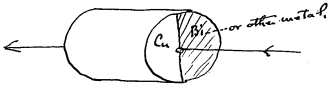
Try little Zinc hydroxide – dissolved in KOH in Ni Fe ~~Storage Battery~~

Run Curve disheq + charging Ni Fe battery in partial vacuum –

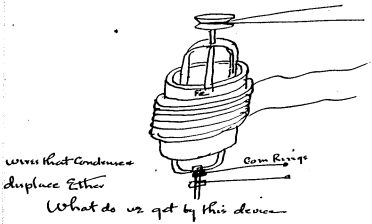
Does silent discharge – giving metallic vapor plating phono
records give spectrum of the metal.

If tripolite proves a success for plating ~~try~~ Copper plating.

If Ether is displaced by Cu a 20 lb Cylinder with 1/32
hole thro shall affect transmission of a beam of light thro

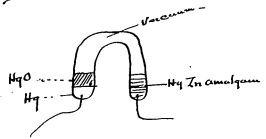


Perhaps a swinging pendulum with Cu or other metal to pass between the Contrivance could get swings per minute when Electricity might not be given or produced only heat,

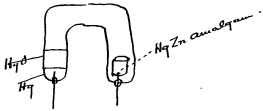


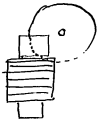
What do we get by this device

Intrying Incandescent Lamps with Center wire + alternating Current as a converter have globule Hg inside to increase Conductivity



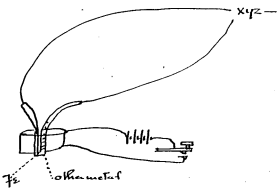
Vacuum Stopcock,

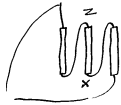




Rubber disk in field - points to Collect static,

April 5 1903





Nernst magnesia heat X end hotter than Z and remeasure thermo voltage,

Possibly peroxide lead in fine powder mixed with Zinc dust + put in Vacuum undergo slow oxidization in presence small quantity water vapor + give light, possibly other Combns better HgO + Zn.
Mg powder + PbO_2 BaO_2

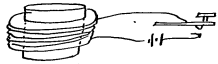
Wood Carbonized on a heated platina strip in Vacuo gives no residue of charcoal Why?

Try Scintillations in closed box with window with Oxygen absorbed by pyrogallic or displaced by H or CO_2 see changes in character of scintillation by absence of Combustion,
try Chlorine Try Sulfides Arsenides, Phosphides + alloys also Scintillations through a magnetic field static field.
X ray field —

As $Ni(OH)_2$ brought up in fused KOH. made anhydrous salt of peculiar character try all other hydroxides, perhaps this will prove to be a new and useful polymerizing reaction.
Test the NiO to see if its a Compound + has KOH in it —

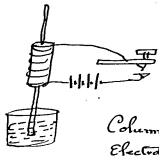
It is possible some curious things will be brought out by this reaction might try mixtures of hydroxides $FeOH$ + Fe_2O_3OH —
see if it goes to Magnetic oxide also that Chromic ox that is magnetic.

Possibly to get a cheap oxide of Iron Ferrous Sulfate could be precipd by NaOH, ½ washed then dried bone dry + then boiled in KOH, + washed the Colloid nature being destroyed by drying —

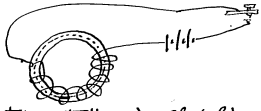


Cup inside coil with different things floating on CP water see if strong Current alters surface tension + cause solid particles to move also see if there is any difference between Electrolytes + non Electrolytes

Capillary see if coil + very strong current alters the Capillarity

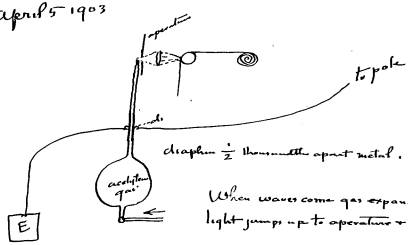


Columns various liquids —
Electrolytic + non Elec



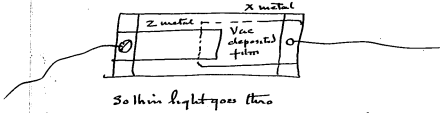
Closed capillary tube with Hg index Electrolytic + Non E
see what effect powerful Current in coil has on movement Hg

Try old Ethereal + Carb Sr Motorgh see how sensitive it is with spark gap + coil, a la wireless —



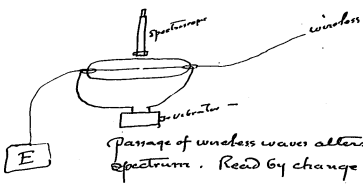
Instead of using diaphr of metal could use two volute spirals of wire on mica both in circuit like electrodynamometer when wireless waves come by mutual attraction & this drawing diaphrs together alters flame.

Put in sealed tubes CS with CP Copper reduced by H. also Fe Ni Zn powder Mg Al powder & set them aside for a month or as if no action warm up as far as can in safe chem both device allowing 4/5 the air space.



So thin light goes thro

deposit on glass mica etc various metallic films that will let light through then put in as a window of a dark box let light shine into dark thro film then pass current thro film also Current thro in mag field & without current.
X ray dif kinds light etc possibly one kind go thro not another



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On account of the tenacity of trans amorph soaps there will be a tendency for knife to dig in & produce vibrations What is wanted is a substance that has no cohesion Possibly Trihydrate of Alumina, perfectly washed— Colloid Silica semi dry or with Alcohol with proper % of water in it possibly mixtures of trans soaps + $SrCo_3$ or Alt. hydrate etc would answer.
Or $SrCo_3$ clay etc in water, Alcohol, Benzol etc or Tripolite or infusorial Earth, Kaolin + a little binder mixed with water— Could use gum arabic Albumen, Melotin, Caramel Acetate non Sugar Trihydr—
Perhaps rotating cylinder of metal kept warm + painted with the mixt as above be ok—
Lampblack in Benzol Bone black, floated clay China, clay

Try the various fusible alloys brought up nearly to MP for recording

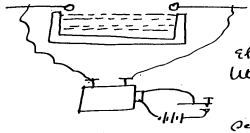
Perhaps Acetate amyl colloid. in can be loaded with soap in Al to give a good recording material

If an amalgam could be found that would not become granular it would be a good recording material, possibly compound amalgams would not be granular.

By using Chloroform, Benzol. Ethe + different Ethers Acetone Aldehyde CS. + dissolving different things in might might by dipping or painting get a very fine powder recording surface, the very rapid evaporation leaving stuff porous, possibly our present reproducing point made dead sharp would record Agel in Ethy on evap. might leave good surface.
If it is possible to get a sufficient porous substance such as soap left by a rapid evaporating solvent then a reproducing point ground rather sharp would for recording be much better than cutting the stuck the pores would be where the stuck would be displaced This is a good direction to work on burnishing action of recorder would smooth track + gold Vac deposit would be good—

A transparent soap dipped in very weak acid might take out enough Na to leave a very porous surface when dried.
Try Al on surface pretty well dried then dipped in alcohol etc
Gutta P Balata in CS on metal mandrel —

Possibly a Tellurium pen will record wireless if so speed could be unlimited



Try dif liquids
Electrolytic + use also
Ultra Violet shining on
surface.
See how effects jump spark.

also when ct passing thru liquid —

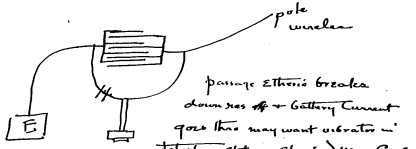
In big Cement Kiln put in small extra gun at hot end where coal goes in shoot regular chalk mix sufficient to form lining —

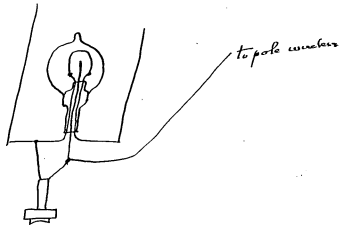
Retry all the metal points on $SrCO_3$ + KOH again —
also — NaOH BaOH SrOH LiOH also KOH in alcohol dissolved
ZnO CdO PbO SiO_2 SnO Manganite ThO also try K salts
of Cy BrCl SO_3 P Ar B.

Possibly phosphorescent sulfides give light by energy absorbed in changing the sulphur molecule or rather crystals from one form to the other. Possibly HgI if combined with another salt to get colorless crystals would phosphoresce by light.

Silver is deposited from every salt in crystals but every dif salt in NH_4 gives different form of crystal — See if phosphorescent when deposited in dark also X ray Mag — Heat, Elec fields —

Remember those sheets of graphite pressed at Menlo in big screw press what rapid conduction heat they had — burnt fingers — now they almost conduct so fast, possibly travels on the surface. There is something abnormal about rapid conduction of heat Investigate —





Perhaps Telluride & Selenide of Calcium will fluoresce also BaS:

Possibly Calcium Carbide put in CS or in other liquids & left would decompose & give crystals of Diamonds or boiled in Molten Sulphur in sealed tube or heated with Oxide Fe in sealed tube or in Molten Boric acid or Dry Chlorine? also thrown into Molten compounds Try Ca Carbide on lot of Solvents having no H_2O with salts & also with fused compounds — see if can alloy it —

It is a strange thing that the thin edge of a broken Carbon filament under the Microscope — is quite transparent but little specs only but general material is transparent. is it a compound?

I've read that Phosphoric Anhydride isn't a safe dessicating agent because it has other phos oxides which are volatile, it certainly smells strong — Party says that dry glacial phos acid is the best — I agree to this —

What would be the effect of immersing a Carbon filament in Molten sulphur & then bringing it up quick to high candle power —

Hammer says Radium changes white to red phos. if this is true, Radium may have the faculty of polymerizing matter & this matter depolymerizing gives phosphorescence —

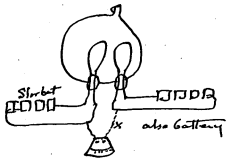
Use a shutter & test all fluorescen for X ray & light as well as phosphorescence — to ascertain their quickness —

If a layer 10/1000 thick of powdered $CaWO_3$ be placed between two plates of thin aluminium acting as a diaelectric will it cause deflection on the galvanometer when ray is vibrating on & off the Condenser One plate lead the Al plate facing Ray try Al & Zn plate, also Al + Cu + etc

If X ray causes air to conduct then a condenser with Al plates & charged with high Voltage with galv in circuit or Moleograph the X ray passing thro the Al plate makes an gap of Condenser discharged — use shutter of lead, possibly telephone work —

With Jwa go on with filing porous Carb fils —

Possibly with Osmium metal in Vac could flash surface of Os on fils & get more light —

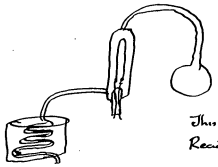


also battery at X get Res —

Silicon in sticks could flash deposit in Vac by coiled coat glass this might show up some phenomenon.
also Zr Ar Te Se the Si film might be oxidized & thus obtain thin film of pure silica for Experimenting

I wonder if strips of aluminium in Vacuum coated over with salts would not flash the salts + cause them to be deposited in films This would be immense for Experimenting give them a good trial all things that distil without decomposing would work + they would probably be amorphous + give films. Those soluble in water could be deposited on a film of something only dissolvable in a hydrocarbon + thus detachable — Sheffield would be immense ! ! Oxide films are possible ?

Here is a good field —

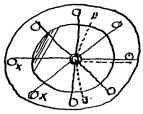


Distil different things over lighted filament also in Vacuo
This might give a new "Master Reaction" in Chemistry —

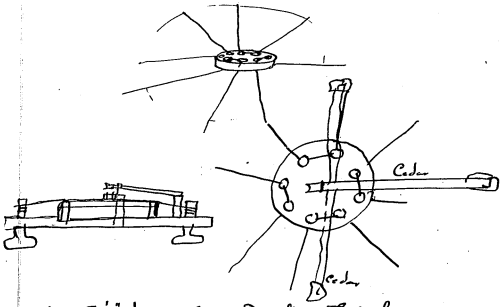
Refraction + dispersion of Selenium is 14 times greater than CS. The film of Selenium is no longer transparent after .003 thick Possibly Vac process will give Thicker
CuO has even greater R+D —

If by a camera a picture is focussed on a polished metal in an electrolyte it is possible on closing the circuit the surfaces could be very weak ly be oxidized show picture where light struck might ox more or less or a metal plated on —

Why not try a lead spectroscope slit + a prism of lead glass + photo X ray see if any lines also use fluoroscope —



New phonograph. Recording diaphm — One inch stretched .002 animal membrane with catgut or silk worm gut strings stretched across dia + tightened by thumb pieces like violin — Center has ring to which strings fastened by this means get enormous elasticity with an extremely light weight hence the strong waves are not distorted by momentum + overtones can be recorded in other words the lighter the diaphm + the greater the elasticity the more truly will the motions of the dia represent the sound waves — The recording knife is on end of Cedar lever fastened by shellac at both ends with side braces also of Cedar —



a 2 or 2½" dia can be made OK on this plan —

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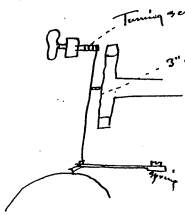

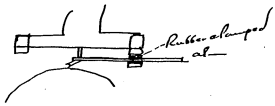

Perhaps Colloids like Alt. Silica ferrocyanide Prus Blue FerroCu mixed with a little glycerine & dried after pressing in cylinder would make good recording Cylinder the H_2O would dry & glycerine keep them from getting hard Dry in Vac with H_2SO_4 —

Perhaps could precipitate the Colloid in solution containing proper amount of glycerine after washing precip —

possibly $SrCO_3$ might work but guess only true Colloid work

How would $AlCl_3$ & glycerine do — There are other non drying things Geodes glycerine, $ZnCl_2$. $CaCl_2$ phos acid $LiCl$ —

It is likely there may be several precip of amorph soaps (metallic) that could be pressed in cylinder find a solvent for neutral stearate of Mg Al, Ni Zn Etc may be some organic solvents —

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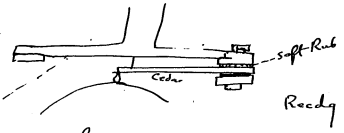
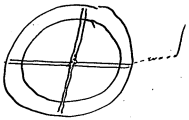
We want a very hard material for dipped records — we could then record lower & less loud + get better quality + then by leverage + multiplying devices get it loud again + thus get quality —

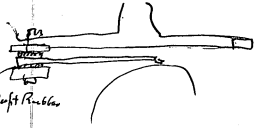
Make string levers lotagh + test piano - Woman's Voice etc + see about quality —

Try Reproducer with Rubber lever etc wood etc — so inertia less so it will give + soften the sharp waves the metal levers used is stiff + has no give it also gives a rebound + sound of itself when ball strikes sides of a deep indentation which it does not follow If an elastic material like hard rubber or cedar wood it would give a little + also not transmit molecularly the impact sound also soften the waves, owing to small specific gravity Rubber would be 5 + Cedar 7 to 8 times lighter.



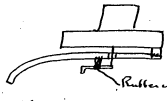
Dia large but elastically got by aligning





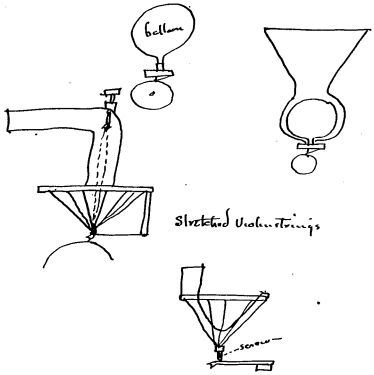
April 5 1907

Repeat



Wood or hard rubber lever —

Instead of a funnel why not use a rubber balloon —



We could make an indestructable record by using shellac Lampblack & Cotton or hair.

Precip some Na Stearate by HCl in water, wash & make cylinder by pressing diff pressures —

See finest graphite can get of amorph variety perhaps Brodie process use for recording. Masters might not need Vac process

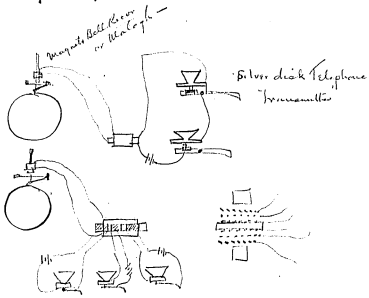
April 5 1903

May be a good germ in using a capillary tube with say .005 hole running a fluid with volatile solvent & evaporate tube up & down by a div. The solution like thick copying ink dries almost instantly if trouble to get it to run. Need use current to drive thro osmotically in water sol + static for organic or air pressure perhaps little air warm blown over to evap + set

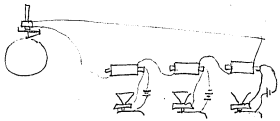
Solubilities Syrian in Chloroform ditto Benzol —
Water SrCo + Sugar
Colloids + sugar Concentrated Caramel. Gutta Per Chloroform
Pears soap in Alcohol – ditto hot –
$SrCO_3$ Chloroform + syrup (little to lock)
" Alc + Resin
" Water + gum arabic
Water + gum arabic alone.
$SrCO_3$ acetate mag to lock

Melting Points (Low)

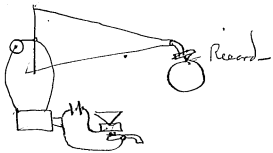
Sb trichl	72
Al Br	90
Sb tri br	94
Stannic Br	33
Tetraphosphorous Sulphide.	142
Ferrico phosphoric Chloride	98
Nitrogen Chlorophosphide	110
Titanophosphorous Chloride	86
Sb Oxychloride	89
Magnesium Chlorate	40
Phosphorous Sulfobromide	36
Pot Disulfate	210
Ammonium Nitrate	108 @ 145
Hydrogen Potass Anhydrosulfate	210
Potass Chlorosulfate	190
Alloys Pb Sn_6 Zn solidifies	168
up to Pb_{10} Sn_{33} Zn "	168
NH_4NO_3 + KNO_3 + $NaNO_3$	137 ?



Process for recording and phone for Musicians without funnel

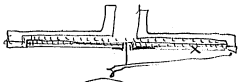


The Carbon Telephones have silver disks with lampblack surfaces same as made by Prof Bell,
If the chalk Telephone could use double diaphragm



May 26 1903 —

A Chalk Telefone dia gives true sound no matter size. The must be because its dead beat, perhaps a friction device can be put on a Reg Recorder for Phono that will make it dead beat or Large diaphm used. Strontium Carb pad might do it — perhaps wants something polished,



dia loose between 2 disks velvet pressed together hole thro bottom plate X dead beat

Nov 16 1903

Crystals which fluoresce to Radium Ray – Regular Slides with small tube of Radium about one milligram – procured from W.J. Hammer, unknown strength – wrapped in 2 thickness of black silk cloth –

Slide No 86 – 2674 – Hydrofluoric acid + Na_2CO_3 + Cr_2O_3
" 2646 " " + $U_2(NH_4)$
" 2640 " + K_2CO_3 + $CuCO_3$

Slide No 83 –
2367 Salicylic acid + Ba
" 2369 " + Cd
" 2368 " + Sr
2371 " + Zn + filtrate a.
2438 Benzolsulphuric + Ba Cl.

Slide 78
1696 – Ag Cl + Uranium Chloride.

Slide No 235.
" 21096 Chinolin Tartaric
" 21094 Strong = Calcium Sulpho-Methic – See book
" 21088 Carbazole
" 21087 – Strong = Strontium Salicylate
" 21070 Carbazole
" 21056 Diphenylamine.

Slide 73
1409 Na Br + Ni Br
1413 " + K Br
1406 K Br + Ag Br
1370 Sr Cl + Bi Cl.

Slide 98

30168 2 grms NaCl + 9 milg AgCl.

Slide 101

" 30324 2 grms KBr. (9 mgs.) AgCl
" 30373 2 grms Cd Iodide + 9 milg AgCl yellow Cryst
" 30374 2 grms " + 25 milg AgCl. "
" 30375 2 " " 1 milg Ur Sulfate
" 30418 Very strong fluorescer - deep yellow Cryst 2 grms KCl - 2 gr Ur Sulfate
" 30326 2 grms KBr + 50 milg AgCl.

Slide 144

" 33032 2 grms BaBr + 50 milg Lithium Borate
" 32967 Strong fluor 2 grms ZnBr 2 grms Ba fluoride
" 33042 2 grms BaBr + 2 grms Cerium Phosphate.
" 33021 2 grms BaBr + 2 grms Calcium Silicate
" 33039 Very strong fluorescer 2 grms BaBr + 2 grms Ba Fluoride

Slide 48

" 3709 Phtalic Acid + Hg CO_3
" 3706 " + Bi CO_3

Slide 13

4250 Cuprocyanide K + Sr Cy
4255 " + Zn Cy
4253 " + Al Cy - very strong fluorescer
4254 " + Cr Cy Very strong "
4223 Permolybdate Borate + Borate Antimony - yellow Cryst
4257 Cuprocyanide K + Ni Cy
4259 " + Fe Cy strong
4260 " + Ur Cy Very strong fluorescer
4261 " + Ag Cy.

Slide 95

8989 P-Cresolinic acid + Carbonates Na + Si? see book
22 Q Dissolved in salt B + R_2CO_3 ?
23 B " " + R_2S
8993 P Cresolinic acid + Carbonates of Na + Mg
8996 " " Na + Zn
46 Q Cuprocyanide K dissolved in Rag ~~[illegible]~~ strong
8994 P Cresolinic a + " Na + al
37 a. Cuprocy K mixed with Nitrate Mg —

Slide 134

32030 2 grms K Br + 50 milg Lithia Borate
32031 " + 2 grms "
32009 " + 3 milg Bi cl.
32050 " + 1 milg K fluoride
32079 " + 2 grms Sulphur —

Slide 161

33947 2 grams K Sulfate + 3 milg Si fluoride
33935 " + 3 " Sulphur
33934 " + 1 " "
33872 " + 50 " Hg cl
33869 " + 3 " Hg cl

Slide 138

32493 2 grms Na Phos + 2 grms Ba fluoride
32433 " K Phos + "
32467 " Na Phos + 25 milg Ca Phos
32498 not on Lithe book —

Slide 154

33603 2 grms Cadmium Iodide + 2 grms K fluoride
33588 " " + 9 mlg Ba Cl
33624 " " + 9 " Zn Cy
33581 " " + 3 " Ca fluoride
33642 " " + 9 " Hg Cl.

Slide 132 -

32056 2 grammes KBr + 1 mlg Ur Sulfate Strong
32070 " + 9 " Ca Cl
32068 " + 1 " Ca Cl
32069 " + 3 " Ca Cl
32071 " + 25 " Ca Cl
32063 " + 3 " Kcy
32103 " + 2 grams Ca Cl
32121 " + 2 grms Ca Silicate
32037 " " " ?
32044 " 1 mlg Ba Cl
31998 9 " Cathos
31997 3 " Cathos

Slide 80

1540 Bromide K + Cr Chloride.
1572 " + Ag Cl.

Slide 94

9002 P-Cressotinic a + Carbonate of Na + Bi Strong fluorescence
21 B
19 Q
Letters unknown 30 a
think Cupro cy K → 18 B
27 Q
9003 P-Cressotinic a + Carbs of Na + Cd
8898 Iodoform (To fluid) Iodoform + oxalate + K oxalate.
9001 P-Cressotinic a + Carbs of Na + Pb
3 Q

over

Slide 94 Continued

8995 p-Cresotinic acid & Carbs of Na + Cr.
22 B
17 B
40 B

Slide 115

31019 2 grms Zinc Phos + 13 milg Mercuric Chloride
30936 " Na Phos + 9 " CaCl

Slide 163

33877 2 grms K sulfate + 25 milg Bismuth Chloride
33950 " " + 50 " Cerium Phos

Slide 242

36702 2 grms Hg Arsenate + 50 milg Ca fluoride
36680 " " + 1 " CaCl

Slide 131

32193 2 grms Cadmium Bromide + 2 grms Ca Phos
31999 " KBr + 25 milg Ca Phos
32000 " " + 50 " "
31939 " NaBr + 25 " Ca Borate
31996. " KBr + 1 " Ca Phos

133 Slide —

All fluorescence - all KBr fused with other chems
None very strong —

Slide 93

34 Q very strong mixed with Nitrate Barium —
2 Q Strong
31 Q "
9004 Cresotinic a + Carbs Na + Ce
32 Q strong
18 a very strong
8999 Cresotinic a + Carbs of Na + Co
26 B Strong
24 a "
29 B
9000 Cresotinic acid + Carbs of Na + Fe —
33a
30 B
28 B
38 Q
42 Q Strong
43 a strong
23 a strong

Slide 142

32662 2 grms Lead Phos + 1 milg Ce Phos
32133 2 grms Strontia Br + 2 grms Zn Cy Very strong
32726 2 " Li Br + 50 milg Baff.
32613 2 " Zn Phos + 2 grms KCy
32733 2 " Li Br + " K Fluoride
32139 2 " Sr Br + 1 milg Ce Phos.

Slide 74 —

1189 K sulfite + tin Chloride
1186 K Sulfite + Cu Sulfate
1178 Na Bisulfite + Sr Cl.

Slide 153 —

33616
33611
33629
33607
33595 — all Cadmium Iodide fused with various chems
33610 — "
33619
33594
33605
33606
33653
33592
33586
33618
33613
33612
33623
33620
33602

Slide 145

	32871	2 gr Ca Br + 2 gr Zn Cy	
	32877	" + 50 milg Ca Fl.	
	32819	2 grms Cadmium Bromide + 3 milg Zn Cy	
	32858	" + 50 "	Sulphur
	32850	" + 9 "	Ca Cl
	32861	" + 3 "	Ce Phos
	32834	" + 50 "	Sr Fl.
	32807	" + 3 "	Calcium Borate,
S. Very strong —	32825	" + 3 "	K Cy —
S. Very strong	32811	" + 2 grms	Calcium Borate,
	32837	" + 3 milg	K Fl
Dirty —	32933	2 gr Calcium Br + 3 "	Ce Phos.

Slide 53

4756 Cyanide Rubidium + Mg Cy
4684 Zirconium Cy + Cu Cy

Slide 22

Fair — 8072 P-Cresotinic + K_2CO_3 + $CaCO_3$
good — 8074 " " + $Al_2(OH)_6$
Very strong 8175 Boro-Benzoic a + K_2CO_3 + Carb NHy
Very dark Cryst 7967 Oxynaphtoic a + " + $CuCO_3$
8068 P-Cresotinic a + K + NHy Carbs
8066 " Carb K + Uranate Na
8065 " " + Zirconia (OH).

Slide 150

33302 2 grms Sr Iodide + 50 milg K Fl
33297
scarcely anything left — Crys. 33287 2 grms KI + 3 " Ce Phos
33263 " + 3 " Zn Cy
33286 " + 1 " Ce Phos.

Slide 146

33123 2 grms Pb Br + 2 grms Sr Fl —
32895 2 grms Cd Br + 9 milg Ce Phos
32798 " + 50 " Ca Fl.
32860 " + 1 " Ce Phos
32845 " + 5 " Ba Fl
32852 " + 50 " Ca Cl
32839 " + 25 " K Fl
32859 " + 2 grms Sulphur
32804 or 32864 — " + 50 milg Ce Sulphate
32846 " + 50 " Ba Fl

Slide 46

Strong Sensitive 4265 Cuprocyanide K + Sb Cy
Strong Sensitive 4270 KCy Cu Cy 2 dissolved + same salt,
Very Brown Cryst Faint 4271 KCy. CuCy 2 dissolved in HKO.
4274 KCy-Cu Cy 2 dissolved in Benzine.

Slide 55

6424- Sulphate of Uranium + Barium -
Very strong - strongest when tube 1st brought to it.

Slide 96

8992 P-Cresoline a + Carbs Na + Cd
Strong 27 B
8990 " Carbs Na + Bi
8981 Cuttfind -
28 Q
47 Q
Strong 24 B
8988 " + Carbs K + Nitly
Letters unknown probably Cuprocy + Hcy verifiers 45 Q
35 Q
Faint 20 a

Slide 8

6520 Salicylic acid + Pb CO_3
6517 " + Ur CO_3
6518 " + Hg O,
dark drab cryst Faint 6504 " + Ca CO_3

Slide No 11

Brown Cryst — 4442 NaCl + AgCl

Slide No 05

Strong 6433 Sulphate Uranium + Pb
Greenish Brown Cryst 6425 " + Ca
6439 " + Sn

Slide 191.

Strong 35371 – 2 grms K Tungstate + 2 grms Ba Fluoride

Slide 42

7320 Sulphanilic a + Si_2Co_3 + $CaCo_3$

7321 " " + $MgCo_3$

Slide 79 —

Fair 1538 KBr + KCl

1536 " + BiCl

Slide 162

33859 2 grms K Sulfate + 5 mlg CaCl

Fair 33948 " + 9 " Ce Phos

33937 " + 25 " Sulphur

Slide 47

6003 P-Cresolinic a + UCo_3

6007 " + $CaCO_3$

grounds dirty 4808 Thorium Cy + Cu Cy

Slide 12

4099 Permolybdate Chloride + Cr_2Cl

Strong 4267 Cuprocy K + Molybdic Cy

Strong 4268 " + Ce Cy

4148 permolybdic Tartrate + Zn Tartrate

strong 4246 Cuprocy K + Na Cy

4249 " + Ba Cy

Slide 30

4064 Cy Ur + Tin

dirty dark 4051 " + Mn

Strong 4263 Cuprocy K + PbCy

4268 " " + Ce Cy

2106 6'6 15

79333

Slide 36

Very strong 4264 - Cuprocy K + Bi Cy

Slide 19
very green 5381 - Phos acid + Carbo Al + Uranium

Slide 218
20139 - Lithium Arsenate.

Slide 15
Strong 7333 Phtalic acid + K_2CO_3 + Sr_2CO_3
Phosphorescence - retains light ? ?

Slide 10
Strong 7579 Sulphosalicylic a + Zr (OH) ? ?

Slide 28
dark brown 7505 Sulphormic acid + U (OH, Na)

Slide 29
7566 Sulphosalicylic a + Zn CO_3
7564 " + Al_2 (OH)$_6$
7557 " + Na_2CO_3
7596 Sulphopseudocumol + Pb CO_3
7591 " + Zn CO_3
7556 Sulphosalicylic a + K_2CO_3

Slide 236

Very Strong – 21135 Uranium acetate
21127 Mercury Bichloride.

Slide 238

Very Strong – 21217 Uranium acetate

Slide 38 –
3953 Hypophos acid + $MnCO_3$

Slide 59
3153 – Phos acid + $MgCO_3$ + $PbCO_3$

Slide 40.
3994 p-Cresotinic a + $CaCO_3$
3995 " + $MgCO_3$
3996 " + $Al_2(OH)_6$
3997 " + $Cr_2(OH)_6$
3998 " + $ZnCO_3$
3992 " + $BaCO_3$
3991 " + Sr_2CO_3
3990 " + NH_4CO_3
3989 – not in

Slide 3 –
Strong yellow 6157 m-Cresotic acid + Sr_2CO_3
6160 " + $Al_2(OH)_6$
6164 " + $ZnCO_3$

Slide 81

2231 Uran Oxyfluoride –
2238a Tantanic a & Mg & Q ? ?

Slide 100

Strong – 30169 2 grms Strontium Chromate & S
25 mlg AgCl – 1

Slide 237

21154 Ca Tungstate. dont think its fused

Slide 227
yellow 20709 Phenanthrene.

Slide 215
20190 Phtalic acid

Slide 228 "
20758 Phenanthren

Slide 91

2686 Hydrofluoric a & Na_2Co_3 & CdO
2685 " " & HgO

Slide 92
Very very bright 21 Q – pby CuCyKCy
2706 HFl acid & NH_4 & Pb_2O_3 ?

Slide 229

20809 Cd Salicylate
Strong 20807 Sr "
20806 Na Paracressolate
20782 Ammonia Salicylate

Slide 113

30835 2 grms Ba Phos + 25 milg AgCl
30836 " " + 50 " "

Slide 112

very green 30890 2 grms Ca Phos + 50 milg Uran Sulfate
S S, I strong 30671 2 grms NaCl + 3 milg KCy S S
S strong 30791 2 grms Sr Phos + 3 milg AgCl.

Slide 103

30322 2 grms KBr + 1 milg AgCl

Slide 111

30794 2 grms Sr Phos + 50 milg AgCl
30793 " + 25 "
strong 30790 2 grms Li Phos + 1 "
30797 2 grms Al Phos + 3 "

Slide 127

strong 31683 2 grms CdCl + 2 grms Ca Phos

Slide 109

30047 K Sulfate
30017 2 grms Zn Br
S 30009 2 " K Chloride S

Slide 202

35881 2 grms Na Nitrate + 2 grms Uran Sulfate

Slide 200

35 842 2grm Na Nit + —mlg CaCl. S S

Slide 195

35559 2grm K Molybd + 3 mlg Uran Sulfate
35503 " " + 2 gr Calcm Borate
S Strong 35473 " " + 2grm CaCl.

Slide 203

quite strong 35971 2gro K Nitrate + 2gr Uran Sulfate
35970 " + 50 mlg "

Slide 217

Very Strong 20234 Iod-Sulphosalicylic acid
Strong 20214 Zn Salicylate
Strong - 20194 Fluorene S S

Slide 230

20834 Hydrastin Purus
white 20821 Acenaphtene.
yellow 20820 Ammon Mellitate

Slide 213

20002 Diphenylamine
20001 Aniline green

Slide 249

37032 2gro K Boate + 5 mlg Uranyl sulfate

Slide ~~218~~ 183

Hettlemyer fusions delaqueseed very little stuff left

34927	2 grms NaCy	+ 1 milg KFl
34933		+ 1 " ZnCy
34924		+ 25 " SrFl
34940		+ 3 " KCy
34891		+ 1 " Li Borate
34947		+ 9 " CaPhos
34915		
34862		+ 3 " CaCl
34954		+ 5 " Ce Phos
34857		+ 9 " AgCl
34935		+ 9 ZnCy

Slide 181

Delaqueement very little left —

34953	
34859	
34858	
34928	
34941	Cant get break out of slide —
34889	
34883	
34881	
34901	
34885	
34886	
34907	
34911	
34913	
34931	

Slide 180

34919 2 grms NaCy & 5 mlg BaFl
34916 & 3 " "
34936 & 25 " ZnCy
34904 & 3 " Ca Silicate
34670 2 grms K arsenate & 50 mlg Mercuric Chl.

Slide 58 —

3167 - Phos acid & $ZnCO_3$ & $PbCO_3$

Slide 75

1226 NaCl & MnCl
1227 " & PbCl.

Slide 66

Very Very Bright 2706 Hydrofluoric acid & NH_4OH & HgO.

Slide 35 —

4856 Thallium Cy & CaCy
4859 " & SrCy
4858 " & ZnCy
4860 " & NiCy
Bright 4868 Uranium Cy & HgCy
4808 Thorium Cy & CuCy

Slide 54

6064 Tetrachloronaphthalic acid & Sr_2CO_3
6000 p-Cresolsulfonic acid & $NiCO_3$

Slide 170

34040 2 grms Na Sulfo.^{5} + 50 milg Sulphur
34021 2 " Na Sulphate + 3 " KCy

Slide 152

33589	2 grms Cadmium Iodide +	25 milg	BaFl
33652	"	1 "	Ce Phos
33587	"	3 "	BaFl
33604	"	1 "	Ca Borate
33596	"	50 "	Sr Fl
33634	"	1 "	Sulphur
33563	"	3 "	Uran Sulfate
33622	"	1 "	Zn Cy
33640	"	1 "	HgCl
33630	"	9 "	KCy
33598	"	1 "	KCy
33590	"	50 "	BaFl
33600	"	9 "	KFl
33599	"	3 "	KFl
33601	"	25 "	KFl
33564	"	9 "	Sulphur
33615	"	2 grms	Li Borate
33578	"	5 milg	Ce Phos
33654	"	9 "	Ce Phos
33574	"	1 "	Ce Phos
33628	"	1 "	KCy
33614	"	50 "	Li Borate

Slide 189

Strong	35269	2 grms Na Tungstate	2 grms CaCl
Fairly Strong	35305	"	2 " CaFl
Strong	35293		2 " Ca Borate
Strong	35290		9 milg Cu Borate

Slide 160

Strong	35395	2 grms K Tungstate + 2 grms Ca Borate
Fairly Strong	35389	" + 2 " Ca Silicate

Slide 101

Very Very strong	4263	Cuprocyanide K + Pb Cy
Strong	4254	" + Cr Cy
Strong	4264	" + Bi Cy
	4268	" + Ce Cy
	4265	" + Sb Cy
Strong	4260	" + Ur Cy
	4253	" + Al Cy

Slide 173

34311 2 grms Cu Iodide + 2 grms KCy

Slide 182 =

	34938
	34838
Heilmann Tons	34819
Finsen	34853
	34934
Very Little	34839
	34840
	34843
Left	34869
	34893
delayment	34849
	34888
	34870

Slide 31

Strong 8079 P-Cresolinic acid + K_2CO_3 + $MnCO_3$
8075 " " + $Cr_2(OH)$
8070 " " + $BaCO_3$

Slide 172

33981 - 2 grms Na Sulphate & 2 grms Uran Sulphate

Slide 68 ✓ possibly 68 + 69 Uranium compound these are Uranium Minerals

1042 Cinetni Chlorid
1041 Acetate of "Josice" S see book
1040 Na Acetate
1039 "Robi" S
1038 Carb Ba
1032 Na Bicarbonate.

Slide 179

34743 2 grms K Arsenate + 2 grms Uran SO_4

Try Radium on Check letters - Use thick Lead rotating shutter - also Use telephone with different substances placed on diaphram + with listening Tubes throw Radium ray on + off the substances by a revolving lead shutter + see if Can hear any sounds Same with light from arc close to. substances

Photo all slides using Barium Platinum Cyanide, Wolframite, Tungstate Ca + Zinc Sulfide Screens to and —

1903 –

Nov 26 – Experimtg with Slides with Tin & also Wolfrmite found on Slide 125

that those of Hetherington fusions very sensitive to scratching giving light on slightest touch of Crystals

Best, 2 grms Chloride Copper + 3 or 4 mg Ba Fluoride
also 2 grms Manganese Chloride + 50 mg Lithium Borate
also 2 grms Copper Chloride + 1 mlg $ZnCl_2$

in first case mica was split + therefore crystals were free, the other not yet perhaps around Edges some holes in Mica – my Impression is that there are lots of Crystals sensitive to abrasion to give light. Have Dolly make lot tubes, get Vac + seal – by shaking get light

Dec 6th 1903

Try revolving lead shutter + Radium on Ebnograph – Comb Sr – ditto X ray –

Try X ray also Radium under oil – film dope receptible –

Get the new Electrode Ultra Violet Quartz window device show by Hammer + Try all slides for fluorescence + phosphorescence –

Make disk of lead with sections varying thickness – test relative strength of fluorescence for X ray + Radium –

Try Effect of heat on fluorescence with X ray or Radium

Make slides of washed Crushed ore

ditto Sands from every source

Ditto, samples of granite in Lab – ditto
Collect Country + Coal rock –

Get samples from Tertiary Strata Every Kind
Iron – make slides of crushed screened & washed
ditto –

SB = Mix with Bismuth hydroxide every other
hydroxide in various proportions to bring
up the Vatherge,

Try Ultra Violet light with points of all possible
metals, also for photo through opaque subs with slides –

If Water from Rocks is Radio active possibly
Scale from boilers or mud from Mud drum or
Scale from pressure will give Radium –
possibly valuable part wood ashes – slag from
Sudbury – Blast of slag – slag from Oxford.
Roaquefiel gold alay –

Notice K Sulphate, KBr SrCl. SrBr
Cd Iod fluorescence perhaps impurity in them
by many crystallizing might cause active
ingredient,

Radium seems to turn Uranite deep green at least
little piece I used on slides which was white at
first is now yellow green,

Try jump spark points adjusted so no spark +
Ultra makes it jump – then try Radium –
also telephone, balanced + Vibrator, gap on each
side longer one gap by Radium + Sensitive use for
testing for Radium in Rocks etc,

Note
Strong Radium does not affect Voltage or Capacity of E Storage Battery —

Try strong radium tube near end of a wire with shutter Gelatine + X Y Z rays —

Try Radium on microscopic Crystals see R + Voltage changed

See if Radium affects Compass needle;

It is strange that 9% of Bismuth hydroxide mixed with 91% of Ni Hydroxide at the regular graphite showed for equal weights give 10% more milliamperehours than Nickel Hydroxide alone, what is it - porosity perhaps

Try crystalizing fluorescing or other chems in Conc X ray also Radium rays from drops of Conc solution on Micro slides - one under radium one without then examine microscopic -

Also crystalizing within a Coil connected to alternating Current in galv room - use small reg watch glasses & drop outside not in coil -

ditto try fluorescence crystals then trace of it increases power of fluorescence, use a check glass outside Coil —

Make some ammonium sulphur & let it change to Crystalline under photo plate —
Try if ray comes from a Regent drop or if it will fluoresce from X ray or Radium —

Make a slide of discs of metals - photo alone — then in Mag field then in alternating Coil

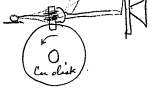
Zirconate of Zinc showed to be good fluorescence for radium + X - also properly made Tungstate Zinc —

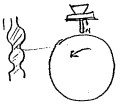
Dec 21 1903 –

Possibly the emanations from tin etc may not photo or produce fluorescence or ionize but it might change friction which it apparently did on the old apparatus in 1873 –
Make a Mahogany wooden barrium platinide + tin with revolving shutter, + telephone – possibly a very good machine could be got up that would be handy + have many embossments on one disk + great many reproducibles disks then could test friction from rays given out by thousands of materials very quickly –

Possibly a cell of celluloid could be used with diff polarizing solutions + use shutter + telephone + let ray strike the polarized polarized electrode –

See if absorption bands changes in liquids where there are slow precipitations going on or about to come down like phosphomolybdate amm test for phos etc –





grooves round frame filled with Hydrogen-saturated or coated over –

magnet to throw arc down

Rotating arc for drilling in Rock in place keystone drill –

Speculative money nothing notably practical

Notebook, E-4298

This notebook was used by Edison during November 1904. There is one additional entry from 1927. It contains notes and drawings relating to experiments with alkaline storage batteries that may have been transcribed from other notebooks. The entries describe numbered groups of experimental cells to be constructed and indicate the results of tests performed on them. The groups of cells differ in their construction and chemical composition. Included are groups made with molasses, glucose, potassium cyanate, and various preparations of nickel hydroxide. Other groups are distinguished by differing treatments of cups and grids and differing charge or discharge conditions. The entry from 1927 is a brief note about a 1904 entry pertaining to iodides in electrolytes. The notebook contains 300 numbered pages; many pages are blank.

Battery Experiments Nov 26 1904

Group cups heated red in vapor sulphur or H_2S passed over to form Sulphide on cups for soaking hot in 33% or 21

Group Extra-heavy plated soaked 33% hot in plating use CP plating solution & CP Nickel anode —

Group unplated Cups

Group all CP Nickel —

Soak Group: Regs in CP (Stick) Alcoholic KOH, 33% hot 48 h
" " " Merecks CP KOH, "
" " KOH from Sulphate "
Group made from C all cups Reg KOH, "
" " Reversed Reg KOH "
Group Reg cups Reg Ni Mallinckrodt Reg KOH, "
" " in NaOH from mallinckrodt 33%
" " " " 21%
Make group 5000 perfo - soaked 48 hours 33 —
" " Reversed "
" " " Changed 15 h 100 in 33% 150 7 hr
" " Not reversed " "

Powder to pass 50 mesh reduce by Hydrogen then act on it Electrically with KOH Containing Hypo this will keep particles from breaking & softening & work ok if pass theory ok —

Reduce Carbonate Ni by Hydrogen then full pass by precipitation & drying with C full. use low temp to keep Ni Crul from shrinking

Nov 29 1904

Make some NiOH by precipitating Sulphate by the po in right proportions then 2 pressures KOH, warm get out basic salts wash & dry—

Open one of the 24 hour Grosse grisha - see how black also if packed close, first soak water #

Boil some NiOH/2 6 hours at 33% 250 Fahr then drain off 33% wash with water (well washed) dry and make group Reg run also group for reversal - group for 120 hours. Use CP Nickel dish bumped up notice after drying of bulk no scaling, 842. dry mix all the above —

Group Regs Changed 33% little NH Carb in solution,

Molasses after thorough cooking mix with 1/2 gram Ni by Hydrogen then dry - put in cups, press — soak — The Ni gives chemical gas coming out,

for 4 hours soak in 33% hot, group of 2 gram pockets 2.2 2.5 2.8 —

Run Reg group curve in 21% long charge 1st then 3 3/4 hour on groups of 2. 2.2 2.5 2.8 3.2 see if output per gram on short chgs is better for thin cups —

Because gas makes the glucose Ni

Tell gas a Duplicate the 5% NH_4CO_3 dry mix of old book

Hereafter used reversed perforations, Rogers make a hot,

Take the twisted 157 - cups soak in water till Koff out then dry & put in new cups when one of it comes back —

Take another 157 Cups reverse in 21% 150 Fahr & Run Reg after that soak in hot water then dry & then put back in 21% chlg & dvslg Reg - if goes thru OK should run

See if I have a group of green soaked in 33 hot 24 hours & then chlg 150 Fahr in 33% 100 rate & then put in 21% chlg 15 h 200 dvslg 100 -

Reverse the bad aluminum Nickel segment a strip hot Change Koff. & Run Reg one of reversing will make it OK —

When the Malaccca group is run first reverse then in 21% warm - say 125 Fahr for 15 hours 100 rate, to get out malaccca - old book showed that glycerine reversed was OK & when not reversed was bad.-

Should try some green that have been dehydrated to yellow point but not too far, use without grafite soak 48 h 33% hot. ~~also~~

Try make a group crimped and corrugated without putting scarcely any pressure on mix think 1½ tons pressure on mix closes up everything & chlorate gets in & closes what little passages left for gas exit & we get terrible polgin Many possibly Corrugate Cups first —

Make 24 to hold 5 cups each mount on rubber tops for Cell tests —

Try the soaked green cups after 4 runs for heavy discharge rate also 2 runs not going below 120 V

Try group where grid saturated with solution of NH_4 & NH_4Cl_2 to slightly dissolve the surface of pieces of mix — dry then put in KOH, & precipitate, then soak water & dry — Run Reg —
Vary the amount & Time of soaking The theory without it will be ok as the NaOH particles together & when Chgd will call be a conductor,
Can try powdered green oxide base of Cu get a Coherent mix this way — Thus a cementing like action of H_2SO_4 on PbO to cement it together, There may be a grand deal in this way of manipulating the Ni mix in the pocket,

Have Warren take a charged num of Ni & Read V 1" apart, 7/8 3/4 5/8 1/2 3/8 1/4 1/8 1/16 to get chgd — also vary the chgd of Cells —

Get a way of getting our KOH free of Alumina

This looking together The green (OH) = by a solvent like NH4 – presence of a NH4 salt. may be just the thing wanted possibly the iron in we can get 330 to V without graphite by soaking hot in 33% so that it softens the $Ni(OH)_2$ & makes a better Ni Contact, – may Explosion only acid issues with NH_4CO_2 gives gramming much good results. Try different methods of $Ni(OH)_2$

Perhaps reg $Ni(OH)_2$ 50 or even 30 mesh coned be mixed with a minor $Ni(OH)_2$ + corrugated then dried + would run good – ditto Reg Mix –

Make groups Reg Ni to be run with green Ni Hg in now —

Reg cups [illegible]

Looking together try weak ~~[illegible]~~ NiCl $NiNO_3$ $NiSO_4$ Nacetate dry + then KOH warm, soak H_2O – etc.

4 Ni in 33% 175 fahr Stick KOH, Reversed 100 rate 15 hours then run in 21%
Average 3.2 500 to V.

Reversing hot or cold in 33% 400 rate gives high capacity 600 To 620
for 1st run in 21% but capacity gradually goes down
there is really no gain

4209 5 Ni Chgd in 33% 175 fahr with 4 grams Silicate Soda in the 33%
100 rate 15 hours. then put in KOH 21% steadily High at 1st —
gradually goes down 6th Run 475, 50, 343, 412, 347 } apparently swelling made bad contact

There is only normal swelling when charged in 33% or
discharged in 21% the great swellings only from
discharge in 33%

4214 Reversed in 33% 150 7. 15 h 100 — 5 grms Bismuth Hydrox No gain

All manipulations of reversing or chg in 33% hot or cold
failure —

4254 to 4269 Reg Ni soaked in 33% on hot plate 140 fahr 48 h 508, 72 506, 96 500, 120 494 — no gain
Run Reg — 21 —

4274 — Same as above but only green Ni hydrox no graf —
Apparently Soaking in 33% hot does lots of good as we
get as high as 323 To Volt on 3.2 grms — 48 hours soak
appears 62 best, shorter or longer dont do as well —

4299 = 5 Ni mix heated 225 fahr before use in pockets for 2 hours.
pockets heated 4 hours 225 each put in cell with 1% KOH.
chgd 15 h 200 dis 100, 2nd run in 21%
1st 113 — 2nd 504 — 3rd 512 — not much gain
Drop but run in 2% on 1st run — 1st 274 2nd 496 - 3rd 516 -

" "	4%	"	1	379	504	520
	8	"	1	448	501	521
	16	"	1	490	513	501
	32		1	463	492	490

4364
4450 Alumina is fatal to the nickel, does not apparently affect the iron — for some unknown reason considerable wing comes out consider little at one end than 1/4 of 1 end than 1/2 of pocket — this should be investigated

4369. Charging in 33% and lamp & discharg in 21%
only gives 440, 437, 438, 438 } a loss —

4374 5th mi
Charged hot 150 in 21% against mi strip then
chgd in 21% normal lamp against strip & then put with
chgd mine & discharg 1st C 325, 495, 415, 593, 583 } 12th dis 502, 576, 493, 478, 405. no gain

There are various irregularities in working hot in 33% (10) chg pt times get high capacity & very low cap some group after 1/2 dis chgs chgs This is Evidently due to bad crump & well —

4404 — A Dry mix which gives good results, 548 on 7th run a dup made long time after Neg — There is great deal in manipulation of the mix & state of packets.

A test of several cups having mix passed out showed spring back — Center 10 Edge 1.2
See No 2 book at end —

4458 A group charged in 33% Containing Aluminum & then taken out & recharged & run in 21% didn't show effect of Aluminum very bad, gives about 400 to V. Think bad effect is in discharg

4463 5 cells Continuing 3 grams KCy - (cant say if on each cell or the whole) chg'd under Reg. gave good results.
gave 1st 33 - 2nd 514 3rd 548 5th 523 14th 530
Evidently KCy is good but further Experts show it frailey - should be investigated -

4468 group with Hyposulphite Soda is pretty good
13th run 515

Iodide of Potassium in the KOH is fatal to it -

496 to Volt seems to be normal capacity for a regular under conditions from 4000 to 7000 -

4424 group reversed perfo chg'd 21% 15 h 100 rate 150 Temp then chg'd Cold goes about 520 on 9th run -
Think there is not much gain, Experts so far dont show that reversed perfo are much advantage

4473 group gone bad by Iodide Sodium down to 65 to ✓
Reversed hot, went on 4th run 385 345 405 - So reversals do partly restore capacity - probably if done in best manner Cond be nearly restored

Alumina Models that have gone bad Cannot be restored by reversing - in fact they grow worse

KOH, 21% in which filter paper has been boiled does no harm.

ditto filter paper + 2 grms pp Mercuric oxide. appears to do no harm –

I think Hyposulphite helps a bad cell.
Cyanide of Potassium nearly restores the Capacity of many pockets from a bad cell –
Think if done right they might be fully restored – See 4493 – to freaky

1 gram of aluminum metal dissolved in each cell – from reg cannot on 9th run cells to give only average of 22 to V.

4504 Zinc dissolved – Electrolyte in small quantity does no harm.

4509 Lead is bad but only probably because it deposits all over –

4519 Cups plated thinly with Iron 1st run 495 14th run 477 = Iron) & considered bad – on long run

4524 Silver plated Cups 2nd run 523 11th 501 – possibly a little better than Reg for these runs –

4529 Cadmium Plated. 1st 510 11th run 504 apparently OK – strange – why

4534 Copper plated 1st 498 – 2nd 507 10th 515 – 13th 503 – apparently OK but no quin

4594 Regs with Iron having no mercury 1st 485 — 15th 485 —
Seems to be very cap + constant.

4599 Same as above but chgd in 33 150° —
12th run 530. Extra Capacity given by 33% Condemned after dropping a Certain amount possibly Endurance tests will show these Non Mercuric runs will be more constant,

4919 Iron made anodes previously in 33% + put with Reg No in 21% no gain —
+ [illegible] by [illegible] in [illegible]

4619 Cells filled with all Carb K 25% Neg — go to V

4624 Group run in 5% KOH 15 K_2CO_3 — 1st 475 — 12th 405 —
4629 10% KOH 10% " 1st 496 — 12th 490
4634 15 KOH 5% " 1 448 12th 462
These are very irregular, think due to bad pockets,

4660 Reg cups 3.2 dipped 3 minutes in our Reg No Sulfate Solution dried on plate then soaked 120 hours in 33% + put to reg cells shows irregular runs from day to day but gives 510 to 525 To V — Many to something in it of properly manipulated —

4665 Reg No with Hg + Zn at bottom gave about 500 — somewhat irregular from day to day

467 No with one side float allen Convex no gain Except a slight gain from 1st To 6th run
1st 495 6th 506 —

4680 Group dipped 3 minutes in Ammonia Chloride Ammonia
4685 Solution in which Nickel hypox is dissolved afterwards soaked 156 hours in 33%

Run Reg 1st 477
2 502
3 517
4 543
5 545
9 513 – I want 1st 462 but average above

Evidently by manipulation there is something in this

4703 Use of smooth Die only – Rinsed two at Not good 7th run 415 to V

4713 Citrate of Potash does not appear to do harm

Reversing heat 150 in 5% KOH. on Regs does no good
4727 Rinsing. Chg in 5% KOH hot. is better but loses + does no better than reg on 7th run to 1st 495
4732 a larger charge 32 hours does a little better, 512

Use of Stick Potash seems to tend to regularity
4765 1st 497 – 3rd 510 10th 489 –

4775 Cleaning inside of Cups with Emery paper does a little good – 4th 510 –

Running in Methyl Alcohol . 0 .
" 33% Sod Na Formate . 0 .

4792 A new nickel soaked 6 hours in Ethyl Alcohol shows good improvement, Evidently something dissolved out that hurt Conduct or acted as insulator — 1st 553 — 8th 557 — This is good — but I notice original Calliper is large than usual — may be mistake made it was due to more Ni in my subsequent Experiments shows alcohol, Benzole no improvement —

4797 Same as above but Benzol used 1st 544 8th 540 — This also shows abnormal large Center Calliper — No good — it was Extra Ni

4802 Juice from shavings of old juice rubber E 18 21% used — Cell — its about normal 3rd run
4807 Pkg ring rubber, about same shade better perhaps

4812 1 gram pp Magnesium hydroxide in each cell.
1st 485 — 6th 488 — no gain —

33% Borax —	"0"
33% Phos K	"8 to V"
30% Silicate Na	"0"
33 Acetate K	"0"

Group of Charged nickels put in Water which is changed many times till rust color in water appears indicating nearly all KOH out. Then put in KOH 21% Recharged This is an improvement 1st 524 4th 566 —
4837 *probably the NiO_2 goes to pieces, There may be swelling ? —

4842 No pressed flat, Rev. & perf — no smooth or Corrugated due used — 480 to V. not so good as Req

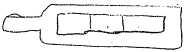
4847 Req Cups Extra heavy plotted at Phoenix Works 1st run 505 7th 522 — this seems to be an improvement

4852 Cells with juice of Bumbler separators about Req 508

4856 ditto with separators Cut from sheet, should better than Req 517 -

4861 ditto thin sheet rubber axles — 518 to V.

4871 Cup sliced across worse than Req 475

4876  3 cups as one

Little better than Req — 515

4881 Gelatin even in large quantity makes daily runs very irregular Thus 428 + 493 - 476 - 383 - 295 - 419 - 490 -

4896 Old C cups 1250 holes with our mix all req - goes less than Req 475 @ 480 to V

4901 Reversed perq C cups 485 to V.
4906 5000 holes. worse than Rey 460 @ 490
Reversed abt same

4924 Sulphate Paloish 2 grms to cell or 2 grms to the 5 cells Cambridge which — apparently does no harm —

4929 - Cups on crimped by a die that wears on Edges only. Rey — 367 to V

4934 Cyanate Paloish little worse than Rey 464 to V 20% Sol Cyanate 17 to V 4937

4944 Group ni Cane sugar seems do no harm.

4949 Tartrate Paloish seems do no harm

4954 New 5 to mch by Corrugtns

5 atmos press.		1st	334	10th	238
10	"	"	424	"	341
20	"	"	444	"	435
40	"		474		425
80	"		482		450
160	"		508		503
200			501	5th	511
250			471	5th	530
300			433	5th	529

poss hydraulic practical

Its doubtful if our presses at the Rly — would give an equivalent to 250 atmos pressure on other press — find out -

4993 -

Aluminum 500 milgms each cell -

	1st	7th
500	309	64
250	364	87
125	391	113
62	423	259
31	461	416
16	467	445
8	486	502

5028 Group - Glucose seems do no harm slight improvement 6th 506

5038 2 grms Acetone each cells

1st	143 -
2	287
3	357
4	421
5	422
6	440

Evidently improves but not

5043 Hypophorous acid - 2 grms each cell - about Reg 6th run

5048 fresh precip Carb Calcium about Reg 495

5053 " " Barium chloride better than Reg 510

5058 " " Magnesia Improvement 1st 522 - 7th 542

5063 Magnesia Hydroxide about Reg

Should judge from Iodide K
that Bromide K would be bad
Chloride K "

Iodide being worst Br K next
+ KCl least

Chlorides are certainly bad in Cells

Sept 1 1927

5068 Mn with Irons having no Mercury 21%
Containing Iodide Sodium –
5073 1st 377 2nd 264 3rd 191 4th 143 –
Hence the Iodine acts itself + not by Hg

5078 Same as above no Hg in Iron
by Aluminum in KOH.
5083 1st 379 2nd 246 – 3rd 182 4th 144

5138 Group 16 milgms Iodide K each cell 1st 471 6th 472
32 499 465
64 456 — 313
125 430 205
250 438 137
500 393 97

5168 Regs with Sluminate K 500 mg in each or all
Containing w/ hydrate cell Ring

5173 21% Sodium from Metallic –
1st 535 2nd 536 – 3rd 530 – 4th 520 6th 512

5178 Group Caustic Lime 10 grms each cell
+ 500 milg Aluminum – 230 to V mg
5183 – Magnesium powder + aluminum do 197 to V

5188 Extra strips put in cell & charged to deposit anything bad — Ng with 500 mlg Aluminum deposit take it out 203 to V

5194 Millons bases does not render Aluminum unnecessary — 260 to V

5199 On account of mess undeveloping when I cast for 250 milgms of Aluminum Cant say if its in each cell or all @ 50 mlg each cell —
With fresh pp Ba Carbonate,
1st 462 6th 390 — possibly Mor $BaCO_3$ would do it if al was small —

5212 glucose stops effects Aluminum but probably Aluminum never put in (Dep these)

5227 Sulphate K — another mistake —

5217 Ba hydrate about Rag 500 to V — 3 grms each cell

5232 Group with 2 grms Fluoride K or Na Seems improved cell — Dep —
525 to V

Stick KOH purified by Ca washed Ba little better than Rag I think

5241 Peroxide Hydrogen seems improves cell 515 to 520 —

5246 Red oxide Mercury dont help the Alumina
5251 green Nickel (OH)$_2$ " "

5261 Heating the KOH 21% in presence of powdered $Ni(OH)_2$ to 150° for 6 hours does no good to run of Reg.

5271. Alumina in 21% with any kind of perforations ~~steel~~ goes bad — also 10% KOH, al just as bad

5306 Ag_2O 2 gms each cell — not so good as Reg. 457

5311 3 gms flower Sulphur Each cell — No — am running 2½ suspension only

5316 5 pockets with a strip run in one cell, with 1 gram Aluminum — + then washed from all Reg cells — 1st 350 2nd 290

5321 Lump KOH, not treated with Ba about Reg —

5336 Calcium Sachrate no good to stop Alumina

5351 5 Reg mix 1 gram Al in 5 cells — 3 grms. KCy in 5 Cells — 1st 556 3rd 525
Evidently KCy can be made to moderate alumina — freely —

5356 ditto with Iron having no Hg
1st 560 3rd 525

5366 Cyanate of K dont stop alumina

5375 Ammonia is bad for Cells it acts on Hg not the Fe

Big Corrglns run in 33% dis in 33% sulph bad on low pressure but — gives low results. Even 300 almost 450 to ✓

5488 — Borax 3 grm — 5 cells abt Reg

5508 Chloride Hydrate. less than Reg 470
Carb Strontia abt Reg
" Cerium "

5533 Grains Soaked 6 hours Grain alcohol 21% with 3 grms KCy Each cell —
1st Run 575

5538 Same as above but with 9 grms ~~treated~~ same way
1st run 299 — ? ? Why

5553 21% 3 grms fresh $CaCO_3$ + 3 grms KCy Each cell
1st run 586?

Reg mix scived out 5 in group –

On 20	1st 508	4th 474	
40	508	488	Seems Great.
60	477	467	
80	471	450	
100	438	453	
120	384	250	
140	313	124	
160	335	217	
180	292	171	

Note!

Tried 2 grms KCy 100 cc KOH 21% on Ni_2O_3 made Chemically – dissolves very considerable Then possibly KCy cannot be used as it might in time soften or gassing would work the grid dangerously – KCy does not dissolve but very little of the $Ni(OH)_2$ – possibly its action in changing NiO_2 explains why get such good results,

In pockets from 9.660 battery which has been run about 2½ months + has lost 30% Capacity notice crystals which exactly resemble mercuric oxide – They are reduced by H_2O_2 to Hg leaving a white frame work of some unknown Element not dissolved by Hyposulfite, KCy Iodide + – probably Alumina – Some pockets have lots of these Crystals + some have none

I have not found any in changed Cups but only in Reversed Cups where all the Ni is nearly gone & the Crystals are in Contact with the Cups & yet are not reduced, this is strange if they are mercury – possibly they do not make Contact –

The Cups which have Lodged in cell after they have gone bad show on opening an iridescent peacock film all over the graphite –

There is no doubt but that there is considerable Alumina & Silica in the graphite used in the Mix all our Experiments are being made with, Also that Graphite Can be purified down to two tenths impurity mostly silica & iron The act of mixing breaks up the cleavage planes & exposes the impurities making them Especially obnoxious – As Alcohol & Benzol remove an exceedingly small trace of matter & yet improve the cell greatly it is a matter of importance to get rid of impurities in the Graphite – Not enough Al etc in anything in cell to account for loss of Capacity as per Dunn analysis –

Iwa finds in old Cells some Sulphide & some none – Evidently the rubber varies in the heat of Vulcanization & leaves the sulphur in different Conditions, some affected & Come out in the liquid & so oxidized to H_2SO_4 – I take this matter up with the Rubber people –

When nickels are fully charged & have then put in water & this charged often there comes a point where the polish is very weak and any poorly plated part of a cup or the frame commences to be rapidly attacked by local action between NiO_2 & the now forming a powerful electrolyt, this is not true of a discharged nickel hence there is a gradual loss of Capacity if the nickel — in 5% or more KOH — There is probably no action on acct of passivity or polarization yet it might be just as well on the cups to be sure of good plating & welding

In all experiments so far increased pressure on cups increases output & the increase seems to be entirely due to the Compressing effect to the smooth glass disc —

Cyanide of Hg in small quantity 100 to 200 mdy in 6 inch small cell where the now has no mercury is beneficial to output Contrary facts | due to Ni or Zn —

Charging cold in 33% 15 hours 100 rate
then pulling in 21% in 6 hours before chg
then chg 15 hours 200 rate disch 100- 1st 440 4th 438
Hence under above conditions Charging in 33%
Cold gives no increase of output.

3 grms water glass in 100 cc KOH 21% does a little
damage when Ni recovered 1507 in 33 - after chg 2nd run
average of group 4284 - That charged in 33% hot
gave average 597 2nd run - 5th run 508, 595, 473, 475

Cell Test Notebooks

These six folio notebooks were used during the period August 1904-September 1911 to graph the performance of various batteries. The first four books relate to Edison's alkaline storage batteries. Included are tests of experimental cells as well as the A4 and A8 production models. The fifth and sixth books contain data on cells manufactured by competitors of the Edison Storage Battery Co., including the Columbia, Eveready, Exide, National, and Philadelphia brands. Most of the graphs indicate that the data was collected or approved by Walter E. Holland. The plots were drawn by Holland, "A. C." (probably Alvin D. Caskey), and others. Each graph provides information on charge and discharge conditions, and most pertain to several cells or several tests. Titles are stamped on the front cover of each book. The four volumes relating to Edison storage batteries have been selected.

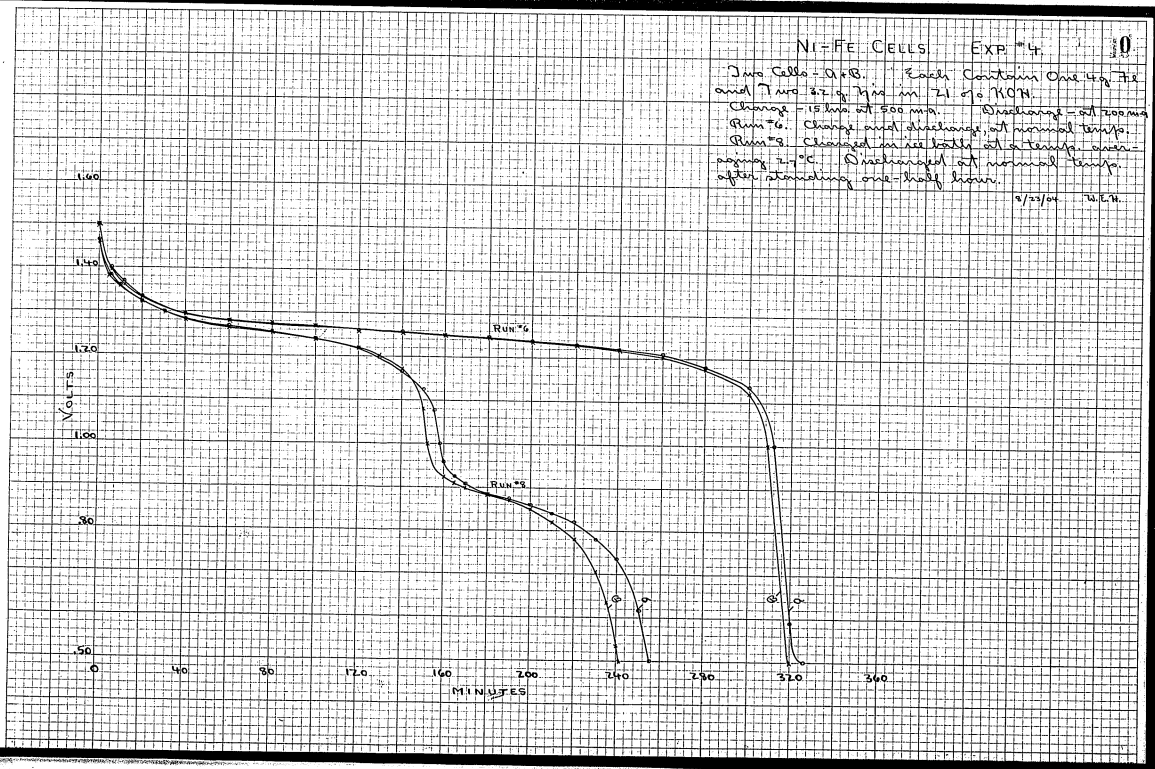
Selected Books

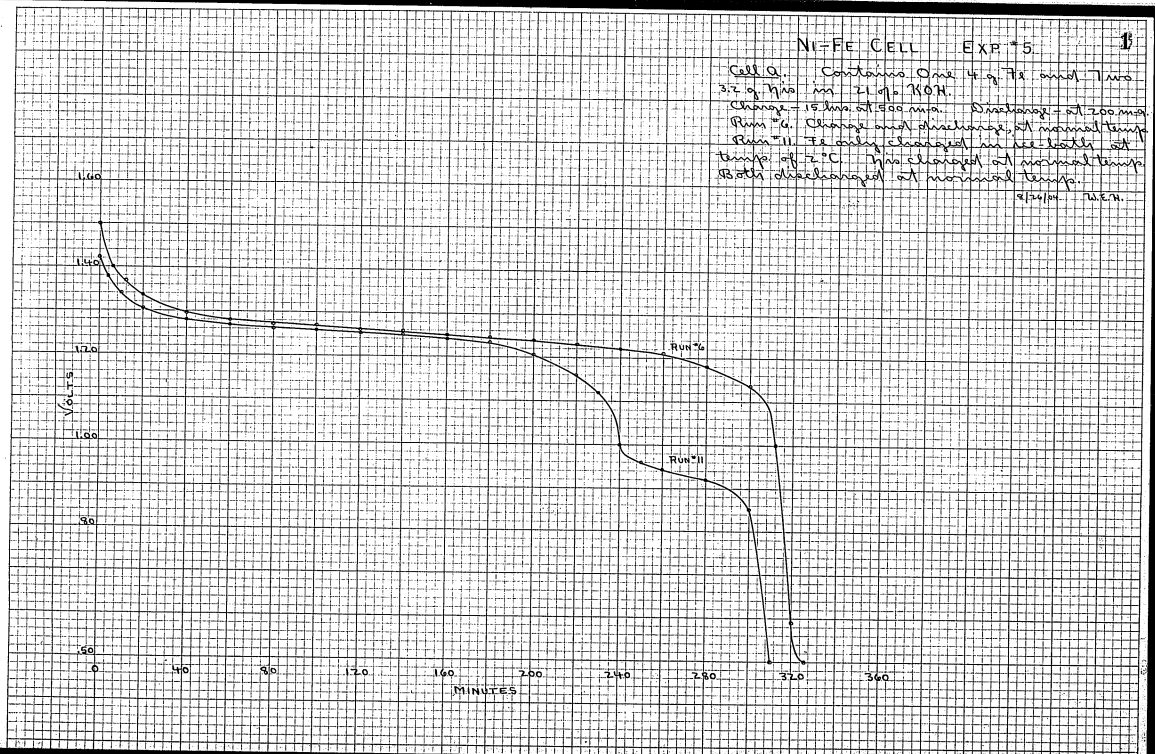
1. "E.S.B. Miniature Cells Vol. I" (eight graphs)
2. "Miscellaneous Vol. I" (one graph)
3. "E.S.B.-Type A. Vol. I" (sixty graphs)
4. "E.S.B.-Type A Vol. II" (fifty graphs)

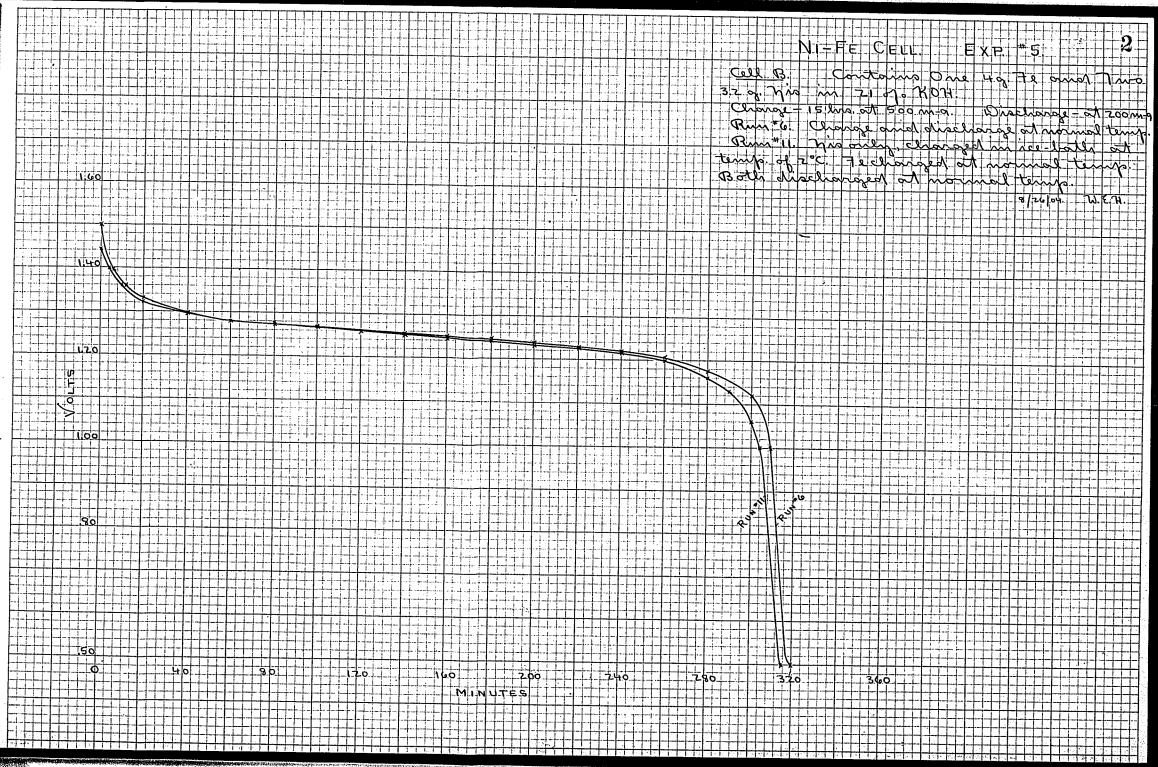
Books Not Selected

5. "Lead Cells Vol. I." (fifty-eight graphs)
6. "Lelanché Cells Vol. I." (eight graphs)

E. S. B. Miniature Cells
Vol. I


Ni-Fe Cells Exp. #4.
Two Cells - A & B. Each Contains One 4 g. Fe and Two 8.7 g. Ni in 21 % KOH.
Charge - 15 hrs. at 500 ma. Discharge - at 200 ma.
Run #6. Charge and discharge at normal temp.
Run #8. Charged in ice bath at a temp. averaging 2.7 °C. Discharged at normal temp. after standing one-half hour.
9/23/04 W.E.H.
Run #6
Run #8
Volts
Minutes
1.60
1.40
1.20
1.00
.80
.50
0
40
80
120
160
200
240
280
320
360

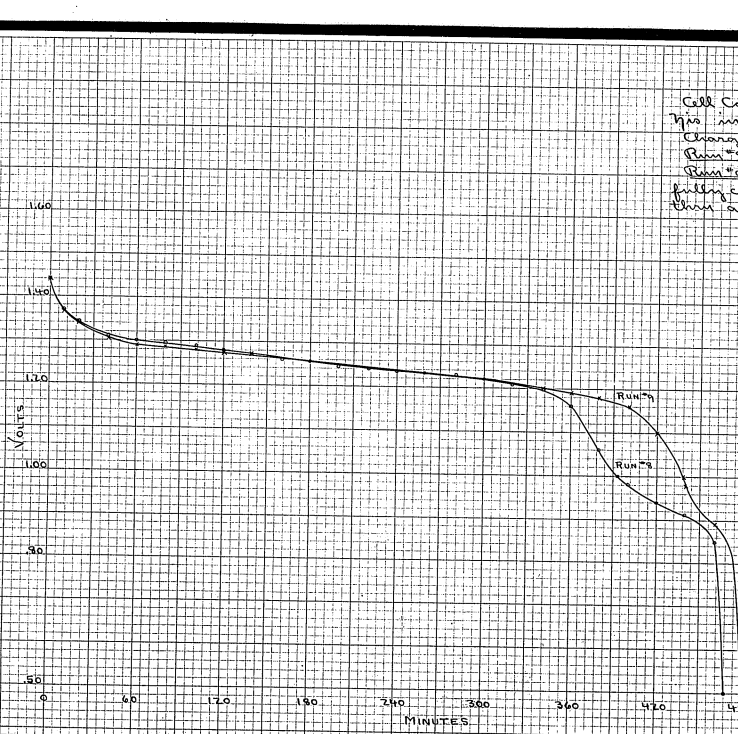

Ni-Fe Cell Exp. #5.
1
Cell Q. Contains One 4 g. Fe and 7 mo 3.7 g. Ni/oo in 21 g. KOH.
Charge - 15 hrs. at 500 ma. Discharge - at 200 ma.
Run #6. Charge and discharge, at normal temp
Run #11. Fe only charged in KOH bath at temp. of 2°C. Ni charged at normal temp.
Both discharged at normal temp.
8/26/04. W.E.H.
1.40
1.30
1.20
1.00
.80
.60
Volts
0
40
80
120
160
200
240
280
320
360
Minutes
Run #6
Run #11


NI-FE CELL EXP. #5
2
Cell B. Contains One 40 g. Fe and Two
3.2 g. Ni in 21 g. KOH.
Charge - 15 hrs. at 500 m.a. Discharge - at 200 m.a.
Run #6. Charge and discharge at normal temp.
Run #11. Charged in ice-bath at temp. of 2°C. Discharged at normal temp.
Both discharged at normal temp.
8/26/04 W.E.H.
Run #11
Run #6
1.60
1.40
1.20
1.00
.80
.60
VOLTS
0
40
80
120
160
200
240
280
320
360
MINUTES

FE CELL EXP. #20.

Cell Contains One 4 g. Fe and Four 3.5 g. Ni in 21% KOH.
Charge = 15 hrs at 400 m.a. Discharge at 200 ma.
Run #7 Start from of the regular series of tests.
Run #8 Is a duplication of Run #7 but after fully charging cell and discharging it then a short circuit.

7/24/20 W.E.H.



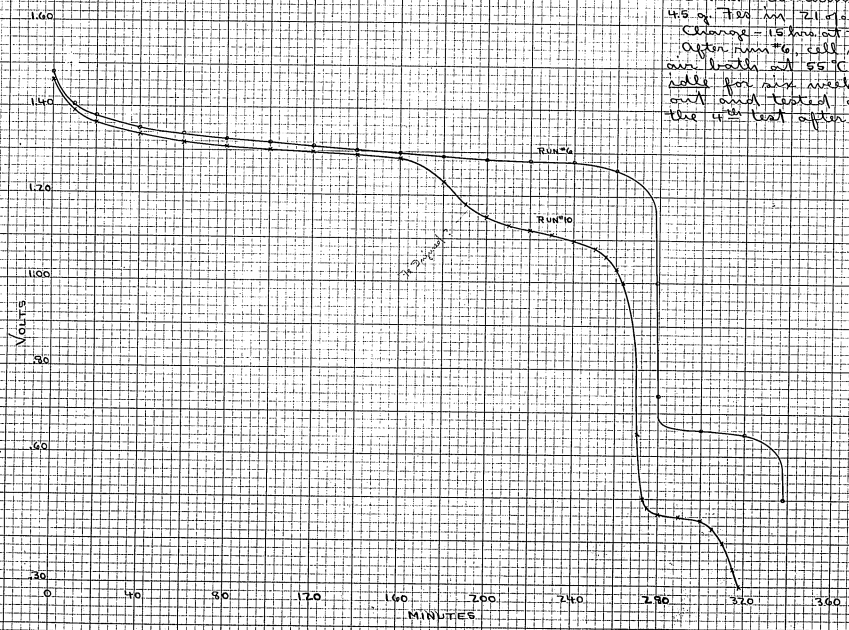
Fe Cell. Exp. #29.

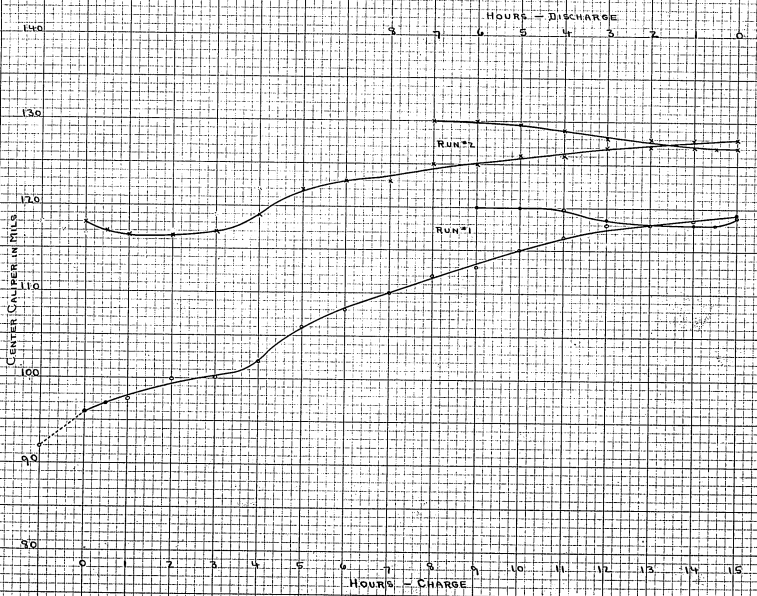
Cell contains One 4 g. Fe and Six Regular Ni in 21% KOH.
Charge - 15 hrs. at 400 m.a. Discharge at 200 m.a.
Run #3 a normal run.
Run #4 a duplication of Run #3 but after fully charging the Fe and allowing it to cool heat in air.

10/23/05 W.E.H.

Ni Cell. Exp. # 21.

Cell B. Contains One 32 g. Ni and Two 4.5 g. Fe in 21 % KOH.
Charge = 15 hrs. at 200 m.a. Discharge = at 100 ma
After run #6, cell was placed in a hot air bath at 95 °C and allowed to stand idle for six weeks. It was then taken out and tested as before. Run # 10 is the 4th test after taking out of hot bath.
1/13/05 W.E.H.

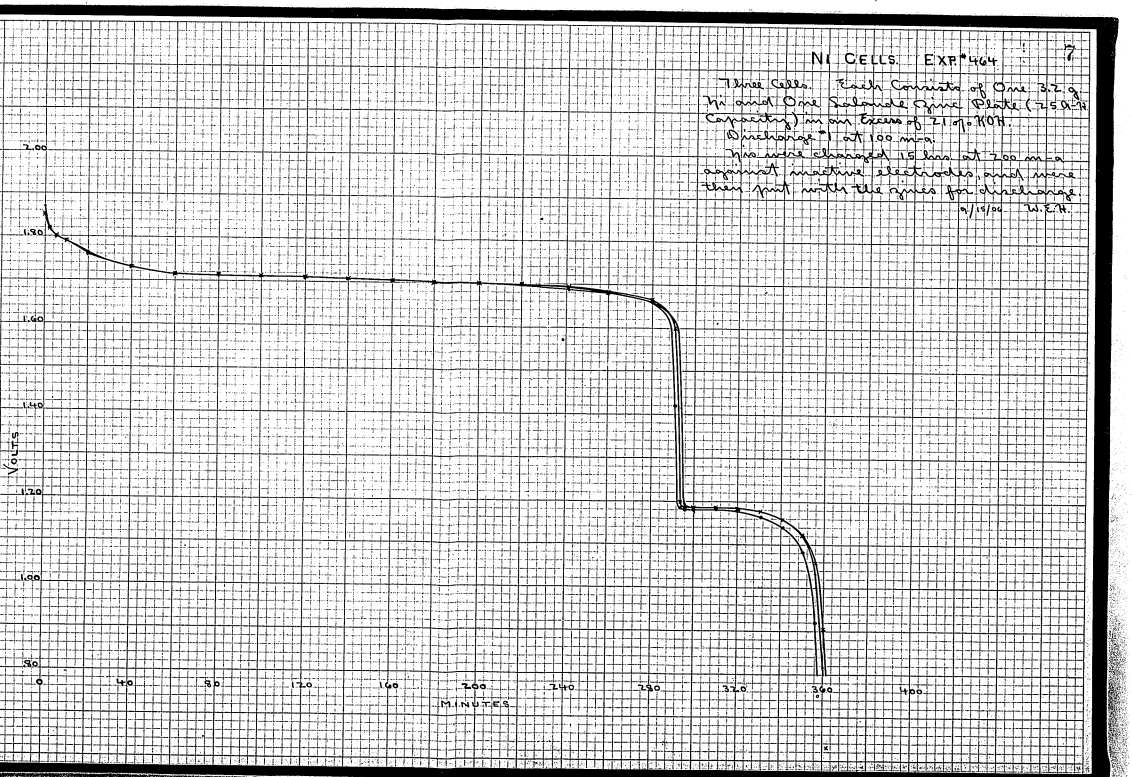




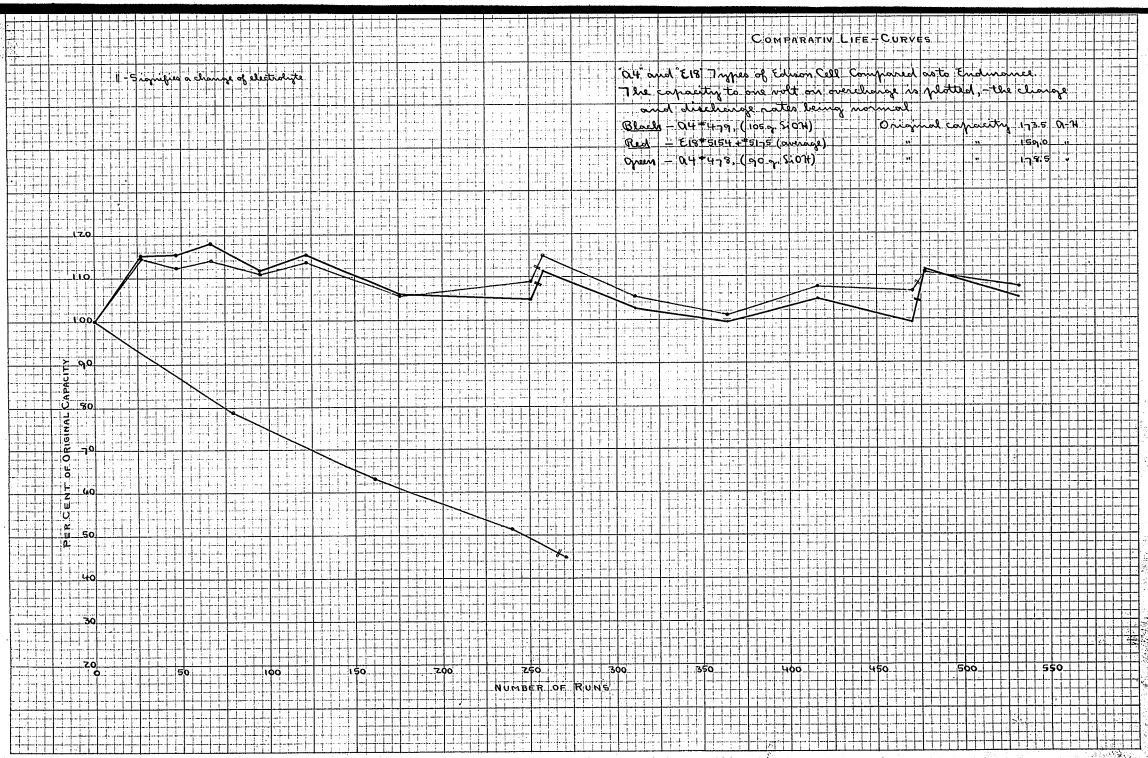
Ni Cell Exp #24. 6

Cell Contains One 3.7 g Ni and Two Regular Fe in 33 % KOH.
Rate of Charge — 200 ma.
Rate of Discharge — 100 ma.
The curves show the swell of a regular Ni pocket in 33 % KOH during charge and discharge. (The dotted line indicates the swell of the discharge pocket on soaking in electrolyte.)
15 minutes intervene between each charge and discharge, and 3 days intervene between run #1 and run #2.
All measurements were taken at a marked point in center of pocket.

10/16/05 W.E.H.


Ni CELLS. EXP. 464
7
Three Cells. Each Consists of One 3.2 g. Ni and One Sintered Sinter Plate (759 g. Capacity) in an Excess of 7.1 g. KOH.
Discharge at 1 at 100 ma.
Was more charged 15 hrs. at 200 ma. against Mercuric electrodes, and more than just with the times for discharge.
9/19/00 W.E.H.
2.00
1.80
1.60
1.40
1.20
1.00
.80
VOLTS
0
40
80
120
160
200
240
280
320
360
400
MINUTES

Miscellaneous
Vol. I


COMPARATIV LIFE-CURVES
"D4" and "E18" Types of Edison Cell Compared with Endurance.
The capacity to one volt on overcharge is plotted, - the charge and discharge rates being normal.
Black - D4 #479. (108 g. S.O.H.)
Red - E18 #5154 + #5155 (average)
Green - D4 #478. (90 g. S.O.H.)
Original capacity, 173.5 A.H.
" " 169.10 "
" " 173.5 "
1 - Signifies a change of electrolyte
PER CENT OF ORIGINAL CAPACITY
120
110
100
90
80
70
60
50
40
30
20
0
50
100
150
200
250
300
350
400
450
500
550
NUMBER OF RUNS

E. S. B. – Type A
Vol. I

EDISON STORAGE BATTERY

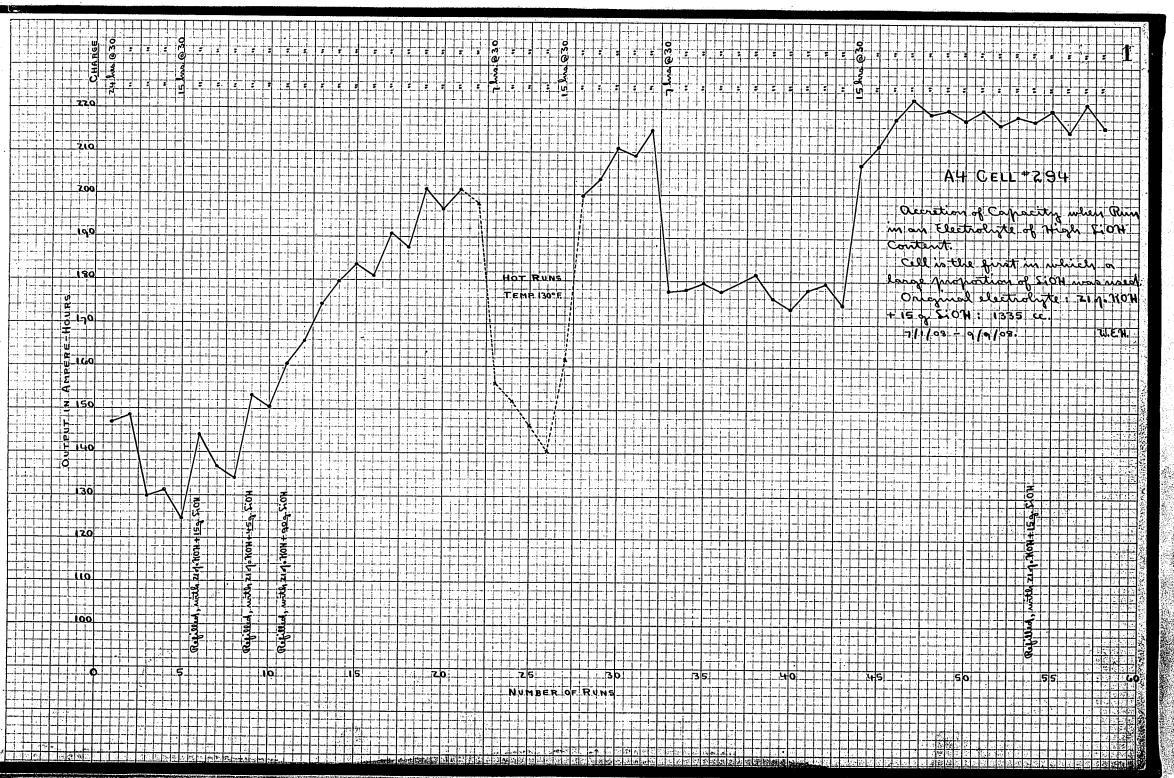
Type "A" Cells

Page

1 Cell #264 Increase of Capacity by additions of LiOH.
2 Hot-Endurance Cells with Special Electrolytes. Run #55.
3 " " " " "
4 Hot-Endurance Cells - Life Curves.
5 " " " " "
6 Cell #210. Normal Overcharge Tests
7 Cell #211. " " "
8 Cell #216 " " "
9 Cell #226 " " "
10 Cell #229 " " "
✓11 Cell #226, Normal-Charge Runs at High and Normal Temperatures.
12 Cell #72. 5000-Mile Cell - Overcharge Tests.
13 Cell #72. Individual Electrode Curves on Discharge #2
✓14 Cell #72 Temperature on Discharge
15 Cell #72 Overcharge Tests under Different Conditions
16 Cell #72 Individual Electrode Curves on a Discharge to Reverse Voltage
17 Cells #14, #21, #23. 5000 Mile Cells. Normal Overcharge Test #4
18 Cell #14 Discharges at Different Rates.
19 Cell #14. Comparison of Cell and Electrode Curves at Normal and High Rates.
20 Cells #365-367. Electrolytes of 27 to 21% KOH with Constant LiOH.
21 Cell #375 Formation by Hot Runs. Effect of Changing to 21% KOH.
22 Cell #381 Formation by Saturated LiOH Solution. Effect of Washing out Alkali.
23 Cell #384 " " Cold Charges
24 Cell #388 " " High-Rate Discharge. Hot Runs.
25 Cell #389 Effect of Bumping a 120 g - LiOH Cell.
26 Cell #389 Normal Runs Made at Rest and while Bumping.
27 Cell #393 Effect of Bumping a 15 g-LiOH Cell.
28 Cell #394 Individual Readings by NiO_2 Test-Electrode
29 Cell #394 " " " Fe " "
✓30 Cell #394 Normal and Cold Discharges with Individual Readings.

Page

✓31 Cell #394 Cold Discharge, Completed at Normal Temperature
32 Cell #395 Formation by Cold Charge Combined with High Rate Discharge
33 Cell #395 Consecutiv Charge and Charge after Standing, with Individual Readings.
✓34 Cell #395 Normal and High Temperature Charges, with Individual Readings.
35 Cell #396 Discharges at Different Rates.
36 Cell #396 Individual Electrode Curves on Discharge at Different Rates
✗37 Cell #396 Temperature on Discharges at Different Rates.
38 Cell #396. Discharge at Different Rates Compared with Continuous Discharges at Each Rate.
39 Cell #396 Ampere-Volt Curve
40 Cell #396 Cold Discharge with Individual Readings
41 Cell #397 Charge, Discharge and Open Voltage with Individual Readings
42 Cell #398 Cell and Individual Electrode Readings on Charge #1.
43 Cell #398 Efficiency Tests, Charging at Different Rates.
44 Cell #398 Individual Electrode Curves on Charges at Different Rates.
✗45 Cell #398 Temperature on Charges at Different Rates.
46 Cell #398 Ampere-Hour Output in Relation to Charge Rate.
47 Cell #398 Input-Output Curve in Ampere-Hours
48 Cell #398 Comparison of Normal Runs Made Consecutivly and after Standing
49 Cell #398 Normal Runs at Different Periods
50 Cell #398 Life Curve
51 Cell #400 Formation by Changes of Rate. Hot Runs
52 Cell #401 " " Cold Charge
✓53 Cell #401 Discharge after a Cold Charge, with Individual Electrode Curves.
54 Cell #402 Effect of Washing with 21% KOH
55 Cell #403 " " Saturated LiOH Shown by Individual Readings
56 Cell #404 Formation by Commercial Running
57 Cell #404 Life Curve
58 Cells #466-467 Efficiency Test at Normal Rates
59 Cell #468 Efficiency Test at Normal Rates
60 Cells #466-468 Life Curves


A4 Cell #294
Alteration of Capacity when Run in an Electrolyte of High LiOH Content.
Cell is the first in which a large proportion of LiOH was used.
Original electrolyte: 21% KOH + 15 gr LiOH: 1335 cc.
7/1/09 - 9/9/09.
W.E.H.
Hot Runs
Temp 130°F
Charge
7 hrs. @ 30
15 hrs. @ 30
Output in Ampere-Hours
Number of Runs
0
5
10
15
20
25
30
35
40
45
50
55
60
100
110
120
130
140
150
160
170
180
190
200
210
220

O.A. Cells

Normal Overcharge Test at Special-Electrolyte Cells after 25 Hot Runs.
Run #35: 9/17/08 Charge—15 hours at 30 amps; discharge rate 30 amperes.

					0-H to 1 V	0-H to .5 V
•	Cell #210:	Electrolyte	16.6% KOH +	109 g LiOH	203.7	214.7
x	" #211:	"	15.1% " +	103 g "	202.0	207.7
o	" #212:	"	19.2% " +	98.9 g "	196.0	204.5
v	" #229:	"	2.10% " +	43 g "	167.5	170.7

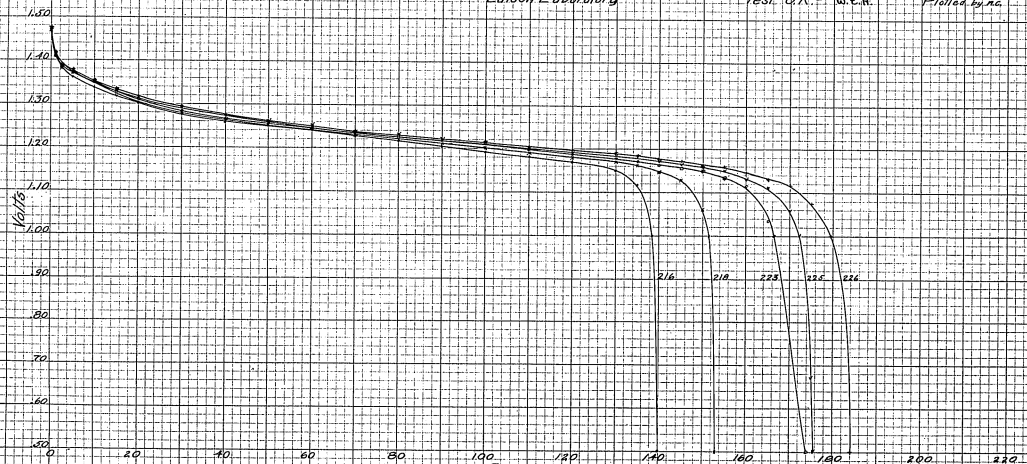
Edison Laboratory Test O.K. — W.E.H. Plotted by A.C.

0.4 Cells

Normal Overcharge Test of Special-Electrolyte Cells after 25 Hot Runs
Run # 33 9/17/20 Charge: 15 hours at 30 amps. Discharge rate, 30 amperes

	Cell #	216	Electrolyte	21%	KOH +	15 g.	LiOH.			1.38.5 V.	1.40.0 V.
x	"	#	218	"	"	"	30 g.	"		1.51.5	1.53.0
o	"	#	223	"	"	"	45 g.	"		1.66.5	1.69.0
v	"	#	225	"	"	"	60 g.	"		1.78.2	1.76.7
+	"	#	226	"	"	"	75 g.	"		1.79.7	1.84.0

Edison Laboratory Test O.K.- W.C.N. Plotted by H.C.



0.4 Cells.

Life-Curves of Cells which were Tested Hot for durability: Showing capacity to 1.00 volt at 30-ampere discharge-rate when charged 15 hours at 30 amperes.

Hot runs made at 130°F.-charging 7 hours at 30 amperes.

• Cell #210 Electrolyte 10.6% KOH + 10.2 g LiOH

× " #211 - #214 " 15.0% " + 10.3 g "

○ " #212 - #215 " 19.2% " + 9.8 g "

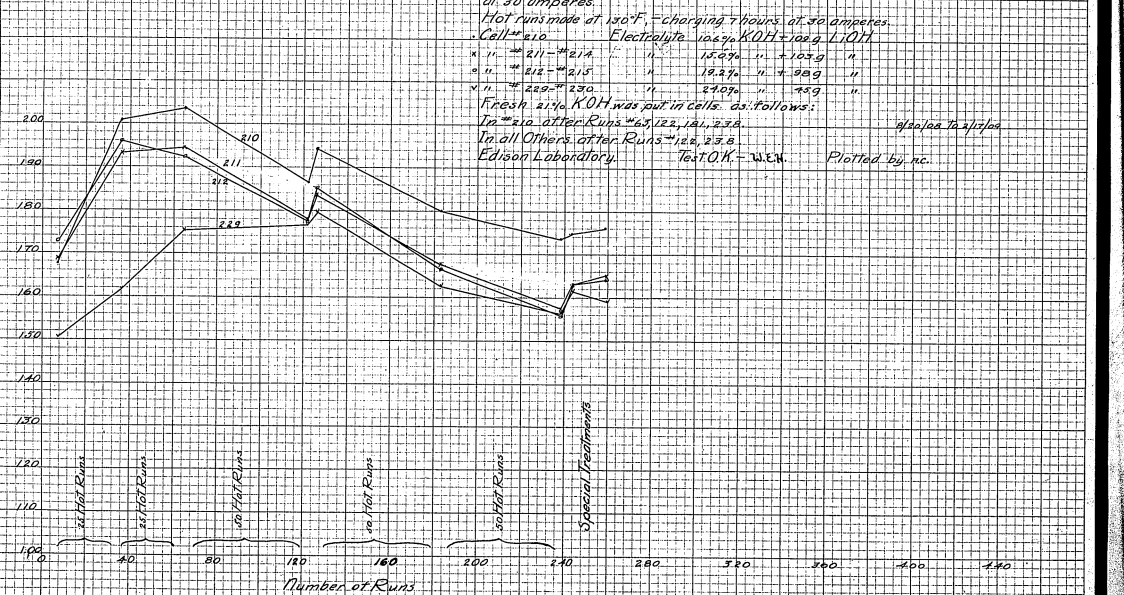
✓ " #229 - #230 " 24.0% " 4.9 g "

Fresh 21% KOH was put in cells as follows:

To #210 after Runs #65, 122, 141, 238. 8/20/00 To 2/17/00

To all Others after Runs #122, 238.

Edison Laboratory. Test O.K. - W.E.H. Plotted by nc.

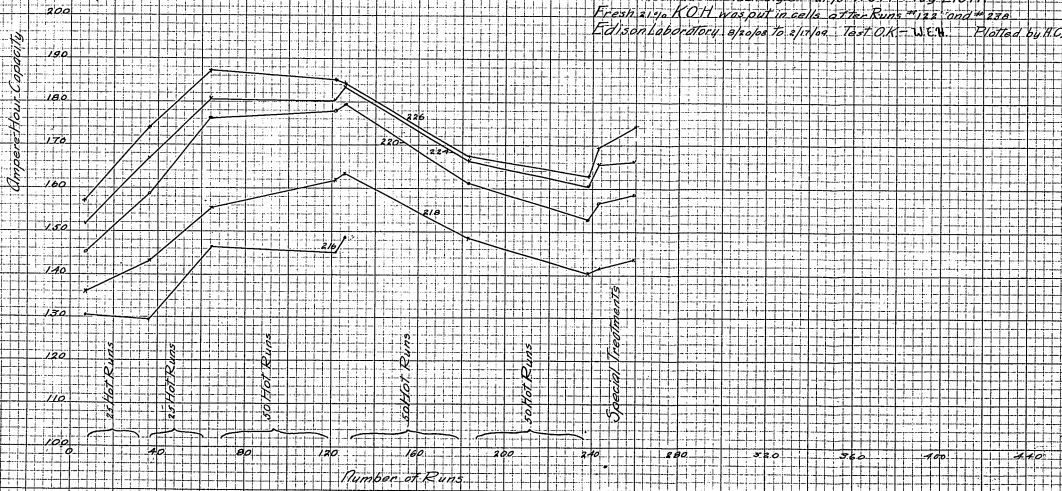


0.4 Cells

Life-Curves of Cells which were Tested Hot for Durability:
Showing capacity to 1.10 V at 30-ampere discharge-rate when charged 15 hours at 30 amperes.
Hot runs made at 150° F.—charging 7 hours at 30 amperes.

•	Cell № 216	Electrolyte 21%	KOH + 15g LiOH
×	" № 218 — № 219	Electrolyte 21%	KOH + 30g LiOH
⊙	" № 220 — № 223	Electrolyte 21%	KOH + 45g LiOH
V	" № 224 — № 225	Electrolyte 21%	KOH + 60g LiOH
+	" № 226 — № 228	Electrolyte 21%	KOH + 75g LiOH

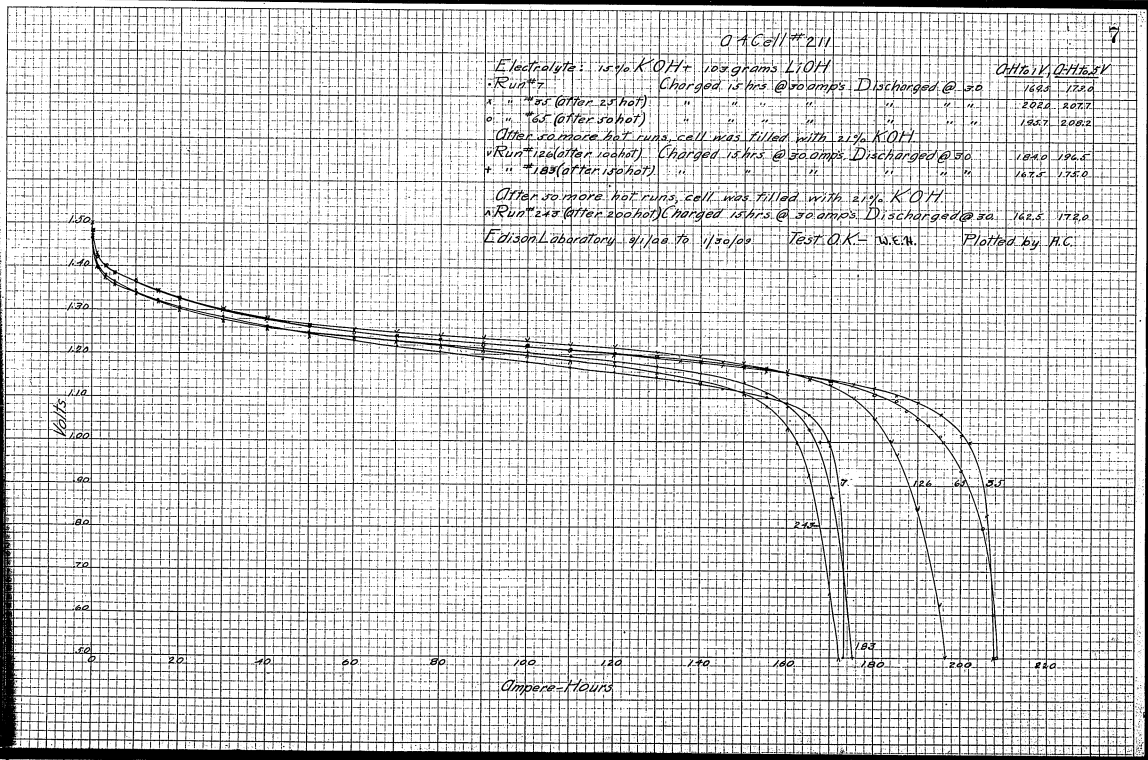
Fresh 21% KOH was put in cells at the Runs № 122 and № 238.
Edison Laboratory, 8/10/98 to 2/17/00. Test OK—W.E.H. Plotted by H.C.



A-4 Cell #210.

Electrolyte — 10.6% KOH + 10 grams LiOH (1330 cc.)

| | | |


O A Cell #211
Electrolyte: is 1% KOH + 103 grams LiOH
O.H.to1V. O.H.to2V
Run #7. Charged 18 hrs @ 30 amps. Discharged @ 30 162.5 177.0
x " #85 (after 25 hot) " " " " " " " 202.0 207.7
o " #63 (after 50 hot) " " " " " " " 195.7 208.2
After 50 more hot runs, cell was filled with 21% KOH
√ Run #126 (after 100 hot) Charged 18 hrs @ 30 amps. Discharged @ 30 184.0 196.5
+ " #183 (after 150 hot) " " " " " " " 167.5 177.0
After 50 more hot runs, cell was filled with 21% KOH
∧ Run #243 (after 200 hot) Charged 18 hrs @ 30 amps. Discharged @ 30 162.5 177.0
Edison Laboratory 9/1/00 to 1/30/09 Test O.K.— W.K.H. Plotted by A.C.
Volts
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours
7
126
63
85
243
183

O-H Cell # 216

| | | |

O-A Cell #226

Electrolyte 21% KOH + 15 g LiOH

		O-H to 1V	O-H to .5V
Run #7	Charged 15 hrs. @ 50 amps. Discharged @ 50	1.572	1.586
" 35 (after 25 hot)	" " " " "	1.797	1.84
" 65 (after 50 hot)	" " " " "	1.872	1.95.5

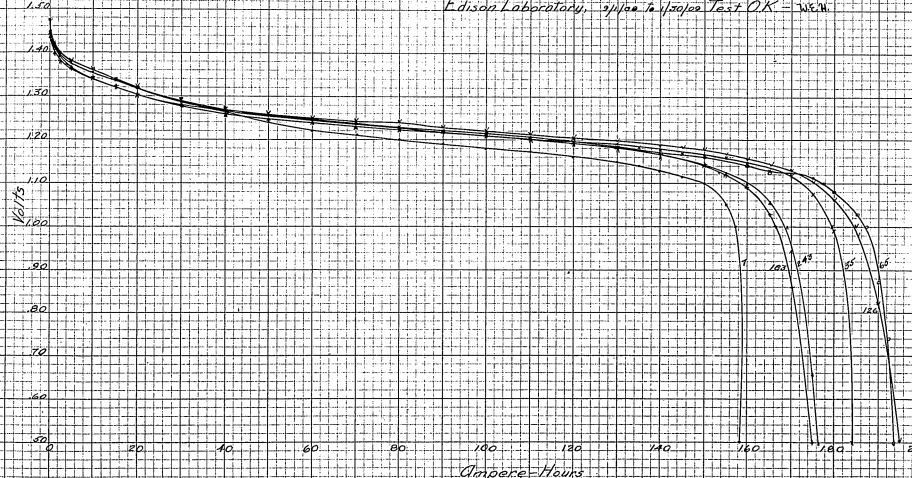
After 50 more hot runs, cell was filled with 21% KOH

Run #26 (after 100 hot)	Charged 15 hrs @ 50 amps. Discharged @ 50	1.84.5	1.96
" 103 (after 150 hot)	" " " " " "	1.66.5	1.76

After 50 more hot runs, cell was filled with 21% KOH

Run #243 (after 200 hot)	Charged 15 hrs @ 50 amps. Discharged @ 50	1.690	1.76.5

Edison Laboratory, 9/1/00 to 1/30/00 Test OK — W.H. Plotted by A.C.



O-Cell #629

Electrolyte: 24% KOH + 15 g LiOH

		Off to V	Off to V
·	Run #7 Charged 15 hrs @ 30 amps. Discharged @ 30	161.7	168.8
X	" #35 (after 25 hot) Charged 15 hrs @ 30 amps. Discharged @ 30	167.5	170.7
o	" #65 (after 50 hot) " " " " " "	170.5	170.5

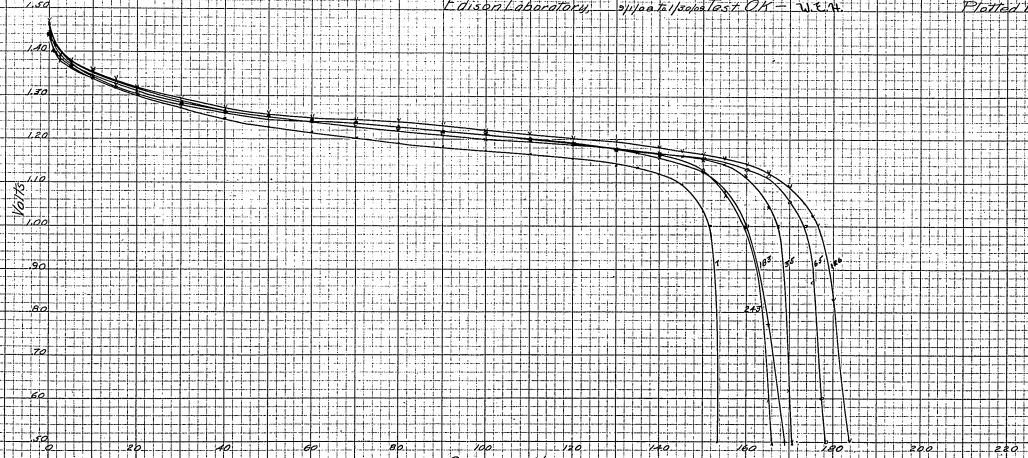
After 50 more hot runs, cell was filled with 21% KOH

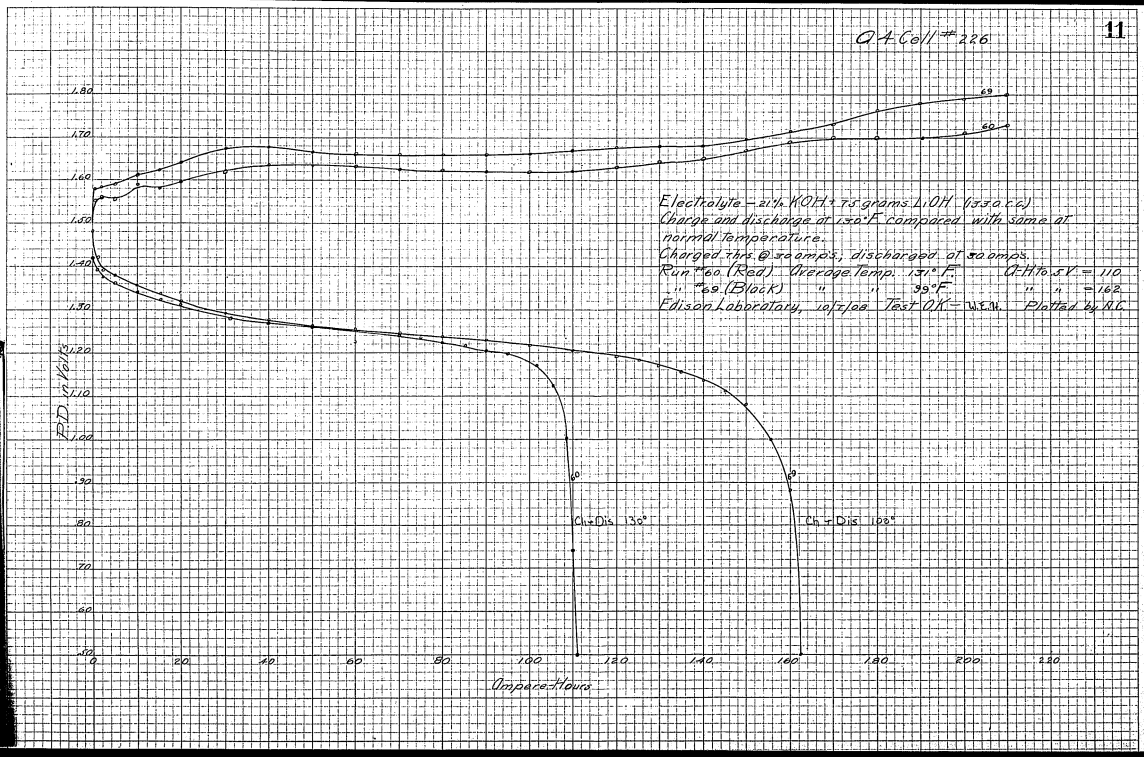
V	Run #126 (after 100 hot) Charged 15 hrs @ 30 amps. Discharged @ 30	176.5	180.7
+	" #163 (after 150 hot) " " " " " "	168.5	169.0

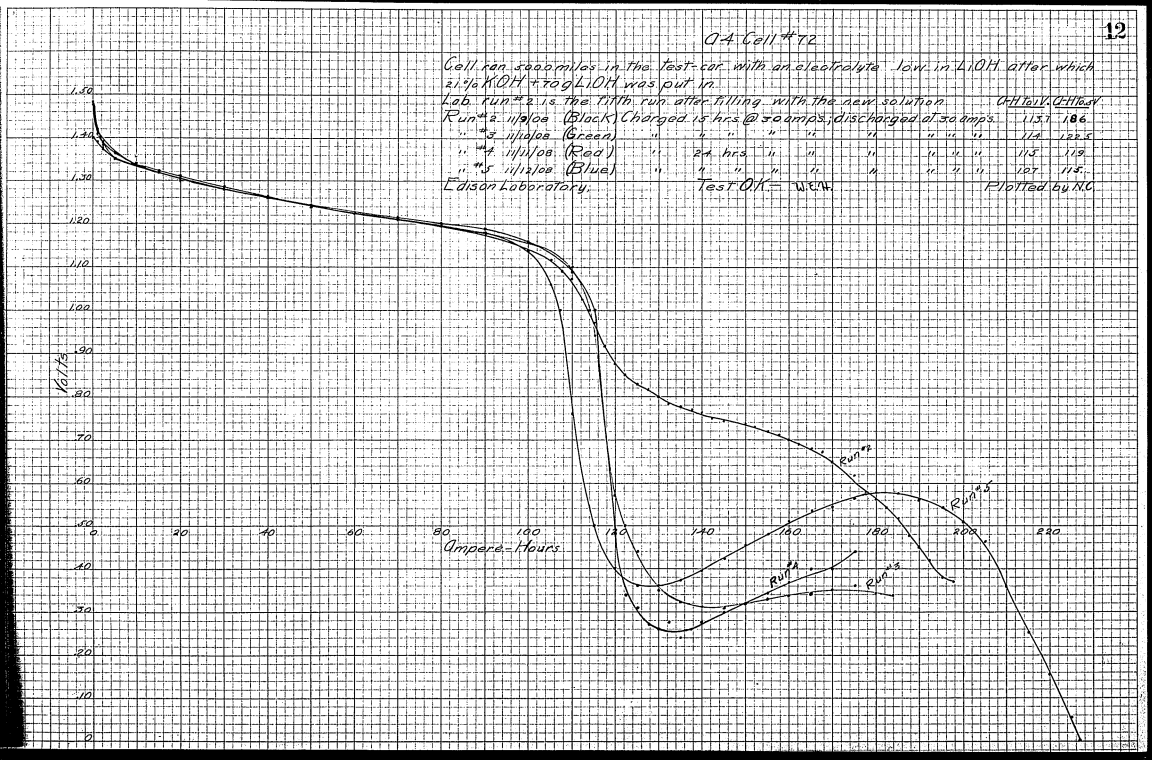
After 50 more hot runs cell was filled with 21% KOH

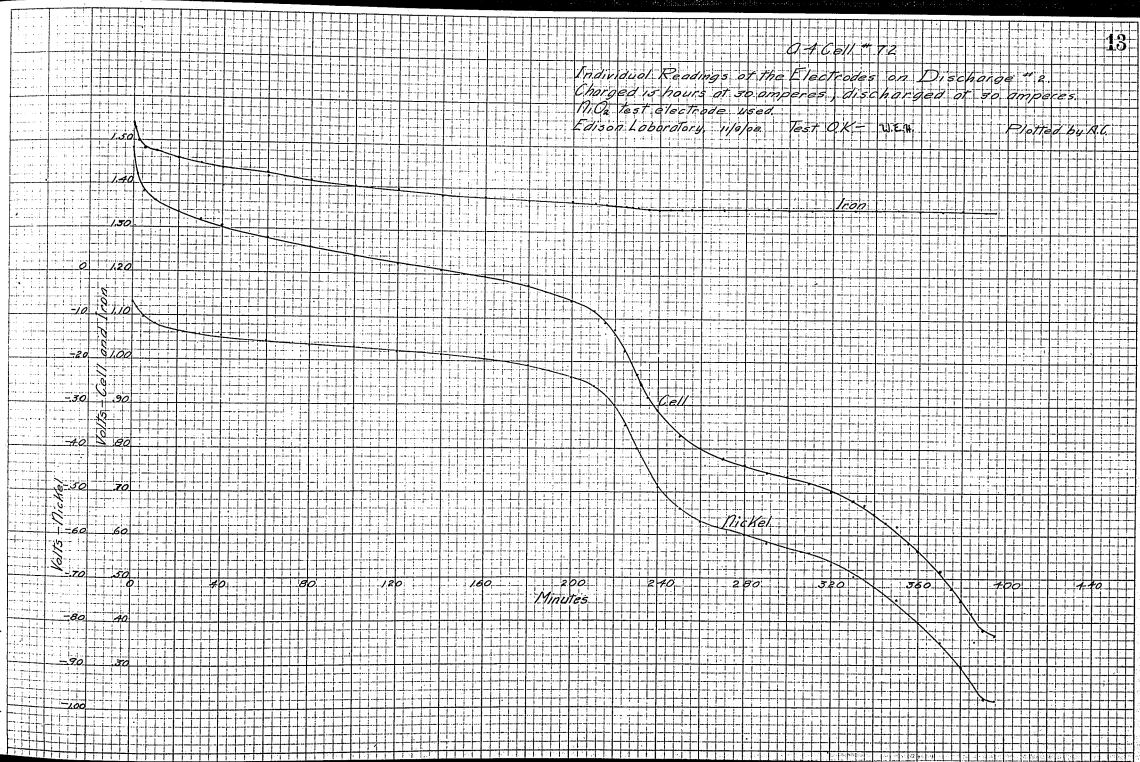
Λ	Run #243 (after 200 hot) Charged 15 hrs @ 30 amps. Discharged @ 30	159.5	166.0

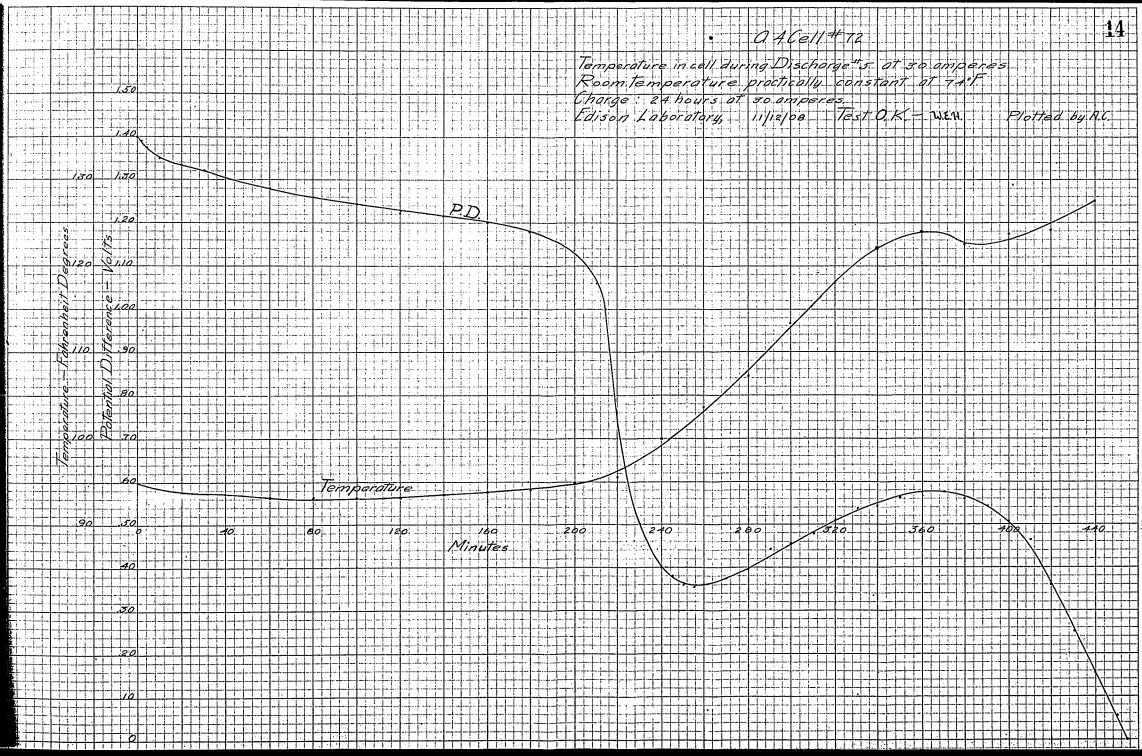
Edison Laboratory, 9/1/00 to 1/30/05 Test OK — W.E.H. Plotted by H.C.

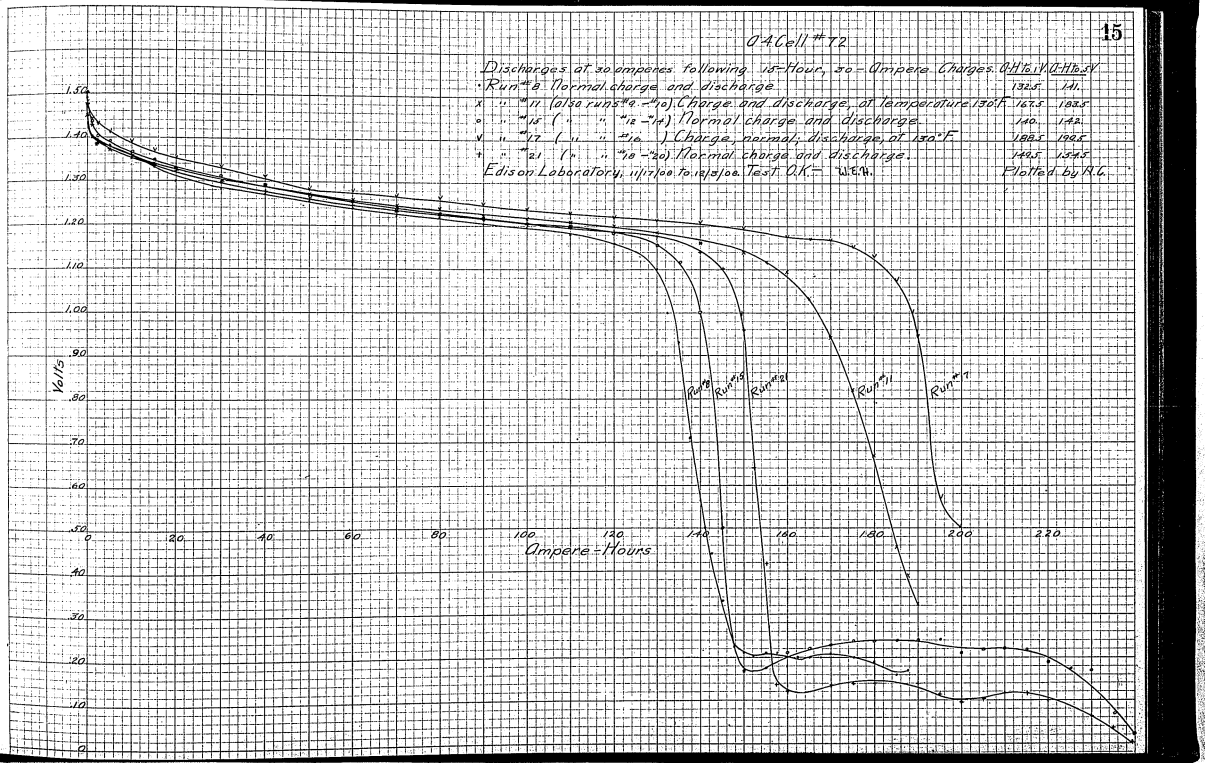


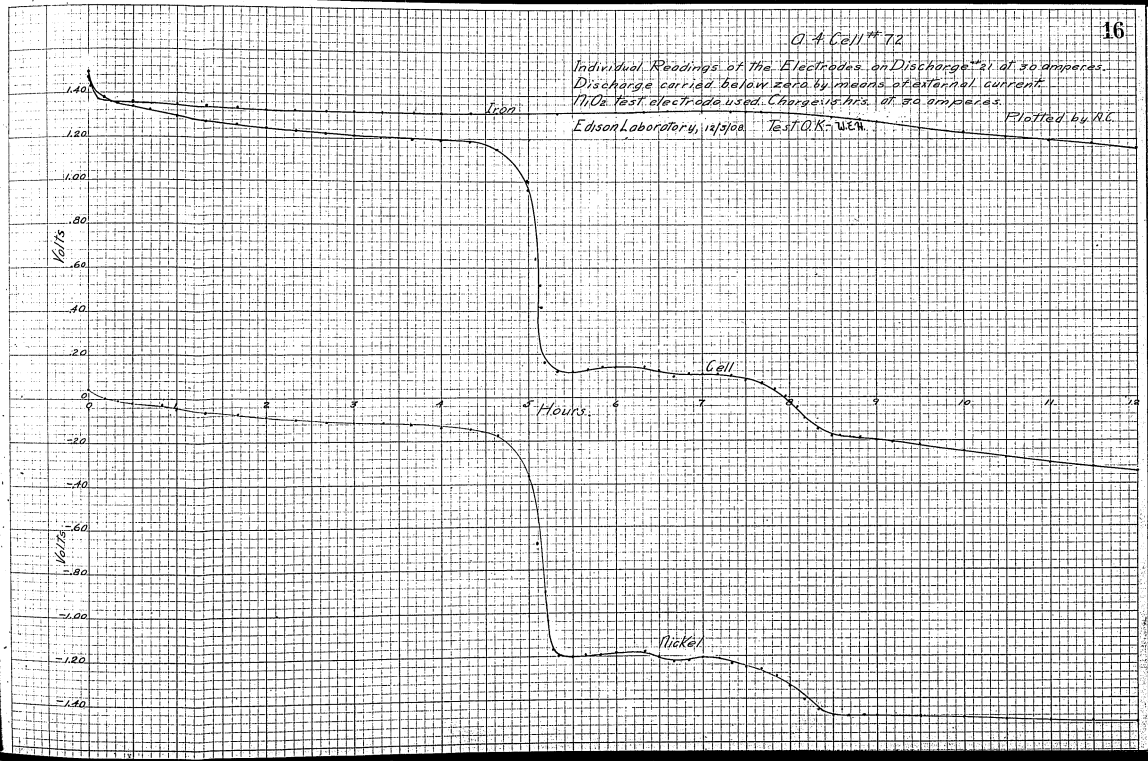

Q.A. Cell # 226
Electrolyte – 21% KOH + 7.5 grams LiOH (1330 c.c.)
Charge and discharge at 130° F compared with same at normal temperature.
Charged 7 hrs. @ 30 amps., discharged at 30 amps.
Run # 60. (Red) Average Temp. 131° F. Ampere Hours = 110
" # 69. (Black) " " 99° F. " " = 162
Edison Laboratory, 10/5/08 Test OK – W.E.H. Plotted by R.C.
Ch + Dis 130°
Ch + Dis 100°
P.D. in Volts
Ampere Hours
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
220
69
60

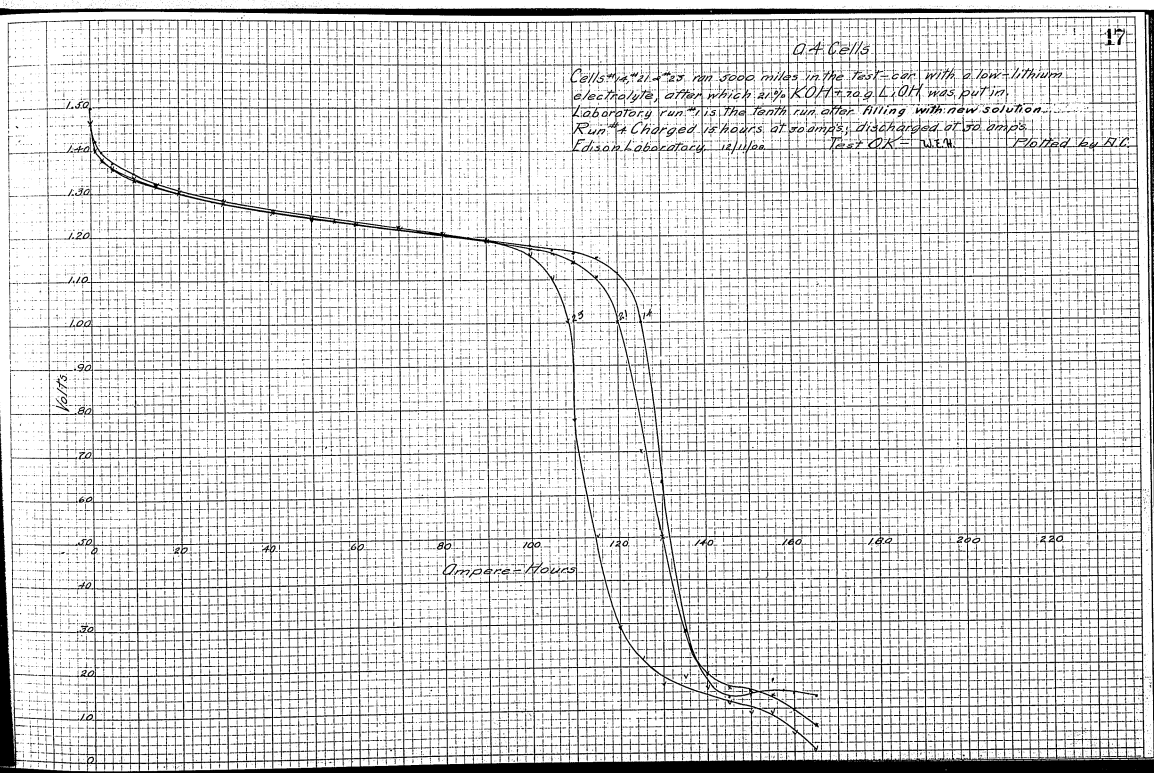

O-4 Cell #72
Cell ran 5000 miles in the test-car with an electrolyte low in LiOH after which
21.9g KOH + 7.9g LiOH was put in.
Lab run #2 is the fifth run after filling with the new solution.
Run #2 11/9/08 (Black) Charged 15 hrs @ 30 amps, discharged at 30 amps. 113.7 106.
" #3 11/10/08 (Green) " " " " " " " " 114 122.5
" #4 11/11/08 (Red) " 24 hrs " " " " " " 115 119
" #5 11/12/08 (Blue) " " " " " " " " " 127 115
Edison Laboratory. Test O.K. — W.E.H. Plotted by H.C.
Volts
Ampere-Hours
Run #2
Run #3
Run #4
Run #5

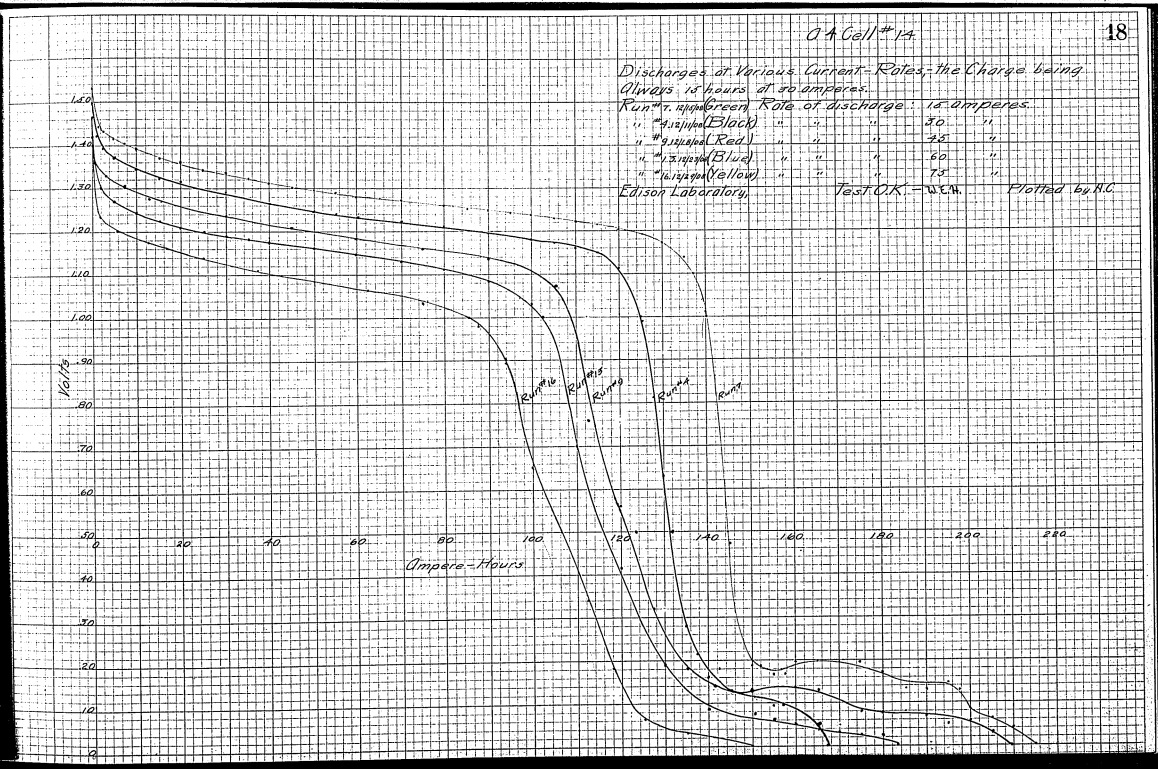

A-1 Cell # 72
Individual Readings of the Electrodes on Discharge # 2.
Charged 15 hours at 30 amperes, discharged at 30 amperes.
Ni Cu test electrode used.
Edison Laboratory 1/16/08 Test OK — W.E.M.
Plotted by R.C.
Iron
Cell
Nickel
Volts - Nickel
Volts - Cell and Iron
Minutes
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
.40
.30
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
40
80
120
160
200
240
280
320
360
400
440

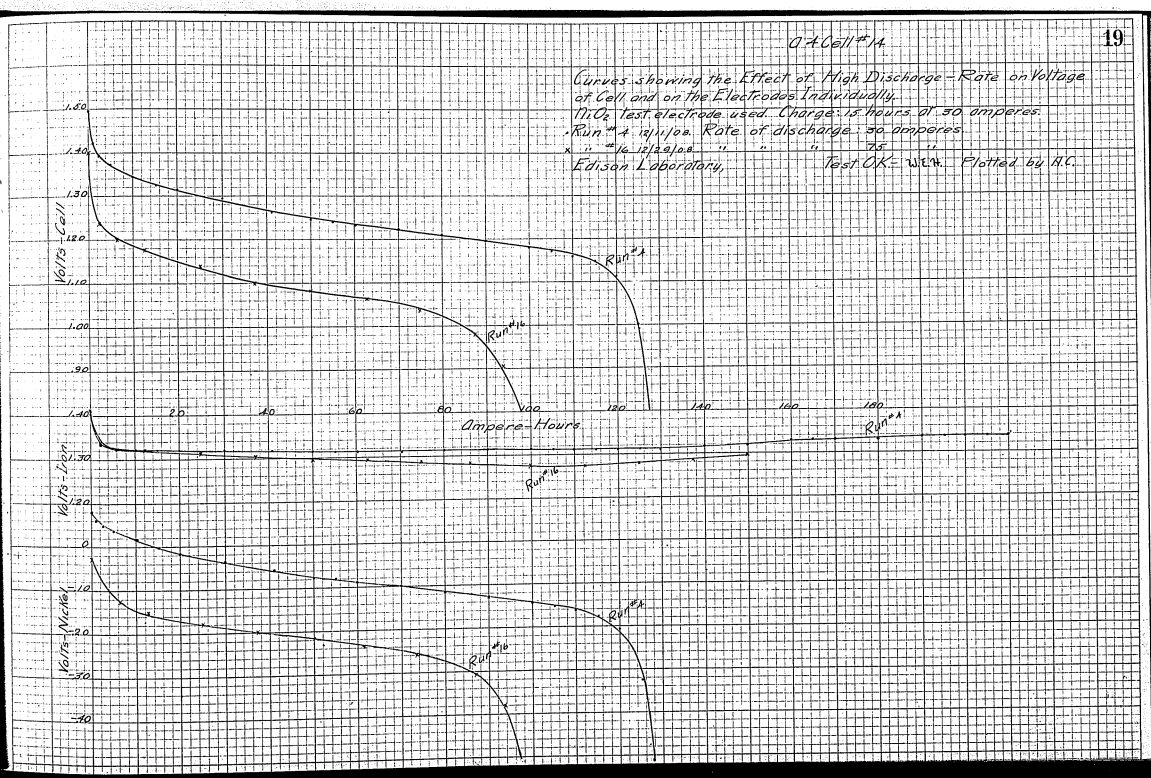

O.A. Cell #72
Temperature in cell during Discharge #5 at 30 amperes
Room Temperature practically constant at 74°F.
Charge: 24 hours at 30 amperes
Edison Laboratory, 11/12/08 Test O.K. — W.E.M. Plotted by R.C.
P.D.
Temperature
Minutes
Temperature - Fahrenheit Degrees
Potential Difference - Volts
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
0
120
110
100
90


O-A Cell #72
Discharges at 30 amperes following 15-Hour, 30-Ampere Charges. O-H Volts O-H Volts
• Run #8 Normal charge and discharge 132.5 141.
x " " #11 (also runs #9 - #10) Charge and discharge, at temperature 130°F. 162.5 183.5
o " " #15 (" " #12 - #14) Normal charge and discharge 140. 142.
v " " #17 (" " #16) Charge, normal; discharge at 130°F 188.5 192.5
+ " " #21 (" " #18 - #20) Normal charge and discharge 149.5 154.5
Edison Laboratory, 11/17/00 To 12/3/00. Test O.K. — W.E.H. Plotted by H.G.
Volts
Ampere-Hours
Run #8
Run #15
Run #21
Run #11
Run #17
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
0
0
20
40
60
80
100
120
140
160
180
200
220


O.4. Cell No 72
Individual Readings of the Electrodes on Discharge at 30 amperes.
Discharge carried below zero by means of external current.
Ni.Oz test electrode used. Charge 15 hrs. at 30 amperes.
Edison Laboratory, 12/3/08 Test O.K. - W.E.H.
Plotted by R.C.
Iron
Cell
Nickel
Hours
Volts
1.40
1.20
1.00
.80
.60
.40
.20
0
-.20
-.40
-.60
-.80
-1.00
-1.20
-1.40
0
1
2
3
4
5
6
7
8
9
10
11
12


O.A. Cells
Cells #14, #21, & #25 ran 5000 miles in the Test-car with a low-lithium electrolyte, after which 21% KOH + 20 g LiOH was put in.
Laboratory run #15 the tenth run after filling with new solution.
Run #4 Charged 15 hours at 20 amps; discharged at 30 amps.
Edison Laboratory 12/1/08 Test OK — WEH Plotted by RC
Volts
Ampere-Hours
25
21
14
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
220
40
30
20
10
0


O.A. Cell #14
Discharges at Various Current-Rates, the Charge being
Always 15 hours at 30 amperes.
Run #7. 12/12/06 (Green) Rate of discharge: 15 amperes.
" #9. 12/12/06 (Black) " " " 30 "
" #9. 12/12/06 (Red) " " " 45 "
" #13. 12/12/06 (Blue) " " " 60 "
" #16. 12/12/06 (Yellow) " " " 75 "
Edison Laboratory, Test O.K. — W.E.H. Plotted by H.C.
Volts
Ampere-Hours
Run #16
Run #13
Run #9
Run #7
Run #7
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
220


O.A. Cell #14.
Curves showing the Effect of High Discharge - Rate on Voltage of Cell and on the Electrodes Individually.
Ni.O2 test electrode used. Charge: 15 hours at 30 amperes.
Run #A 12/11/08. Rate of discharge: 30 amperes.
× " #16 12/29/08. " " " 75 "
Edison Laboratory, Test OK - W.E.H. Plotted by H.C.
Volts - Cell
Volts - Iron
Volts - Nickel
Ampere - Hours
Run #A
Run #16
1.50
1.40
1.30
1.20
1.10
1.00
.90
.20
.40
.60
.80
1.00
1.20
1.40
1.60
1.80
0
-.10
-.20
-.30
-.40

O.A. Cells.

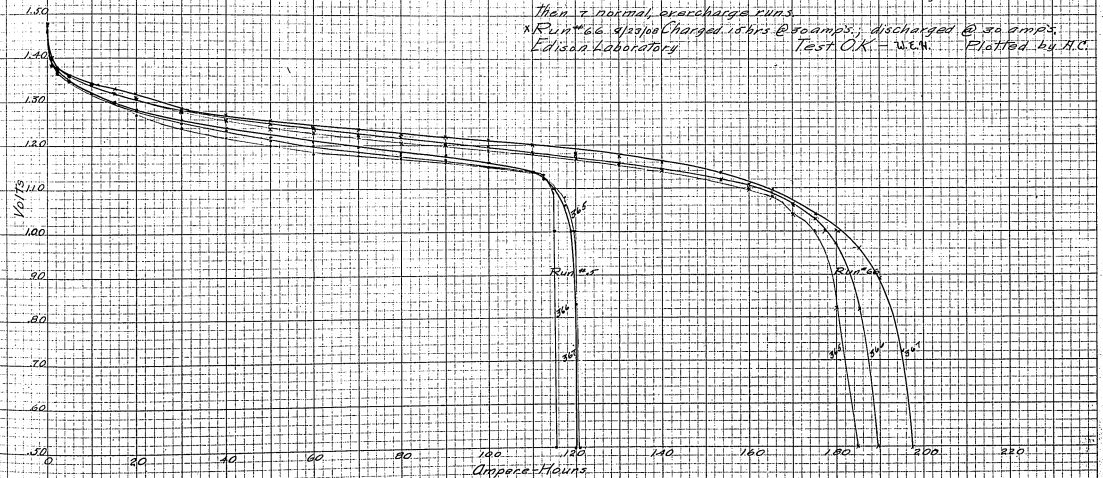
#365 Electrolyte 27% KOH + 15.2 g. LiOH
" 366 " 24% " " 9. "
" 367 " 21% " " 9. "

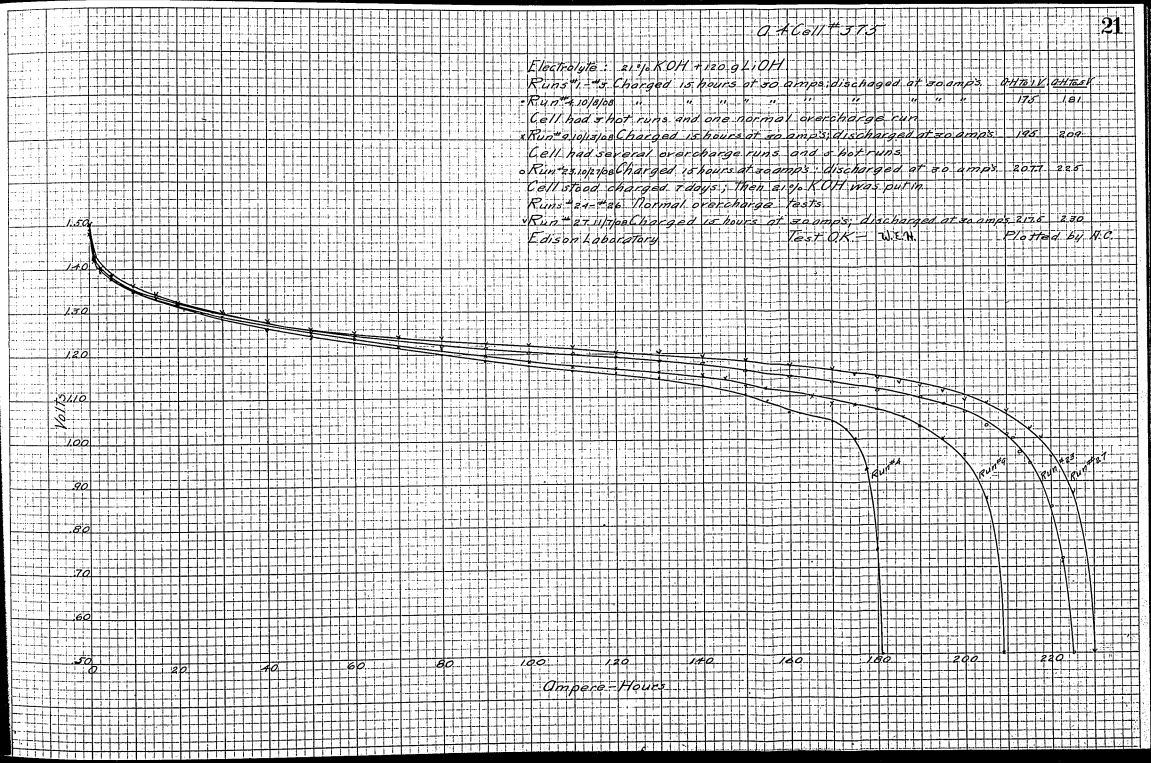
On runs #1-5 cells were charged 24 hours at 30 amps. Fresh electrolyte like the original was put in after run #2. On run #4 the charge was 15 hrs. @ 30 amperes.

• Run #5 7/20/00 Charged 15 hrs. at 30 amperes; discharged at 30 amperes. Cells then had 28 overcharge runs during which 45.6 g of LiOH was added in 3 installments. After that they had 25 hot runs. Then 7 normal overcharge runs.

x Run #66 9/23/00 Charged 15 hrs @ 30 amps; discharged @ 30 amps.

Edison Laboratory. Test OK — W.E.M. Plotted by H.C.




O.A. Cell #375
Electrolyte: 21% KOH + 120 g LiOH
Runs #1-#3 Charged 15 hours at 30 amps, discharged at 30 amps. OHTest 175 OHTest 181
Run #4 10/8/08 " " " " " " " " " " 175 181
Cell had 3 hot runs and one normal overcharge run.
Run #9 10/13/08 Charged 15 hours at 30 amps; discharged at 30 amps 195 209
Cell had several overcharge runs and 3 hot runs.
Run #23 10/27/08 Charged 15 hours at 30 amps; discharged at 30 amps 207.7 225
Cell stood charged 7 days; Then 21% KOH was put in
Runs #24-#26 Normal overcharge Tests.
Run #27 11/7/08 Charged 15 hours at 30 amps; discharged at 30 amps 212.6 230
Edison Laboratory Test OK - W.E.M. Plotted by H.C.
Volts
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours
Run #4
Run #9
Run #23
Run #27

O & Cell No 381

Treatment: Given 1st charge in saturated LiOH solution. After standing charged 24 hours this solution was replaced by 21% KOH and cell was discharged. Cell then had 11 overcharge runs.

			O.H. to 1V	OH. to 1
Run No 15 11/11/00	Charged 15 hours at 50 amps.; discharged at 50 amps.		186.5	194.5

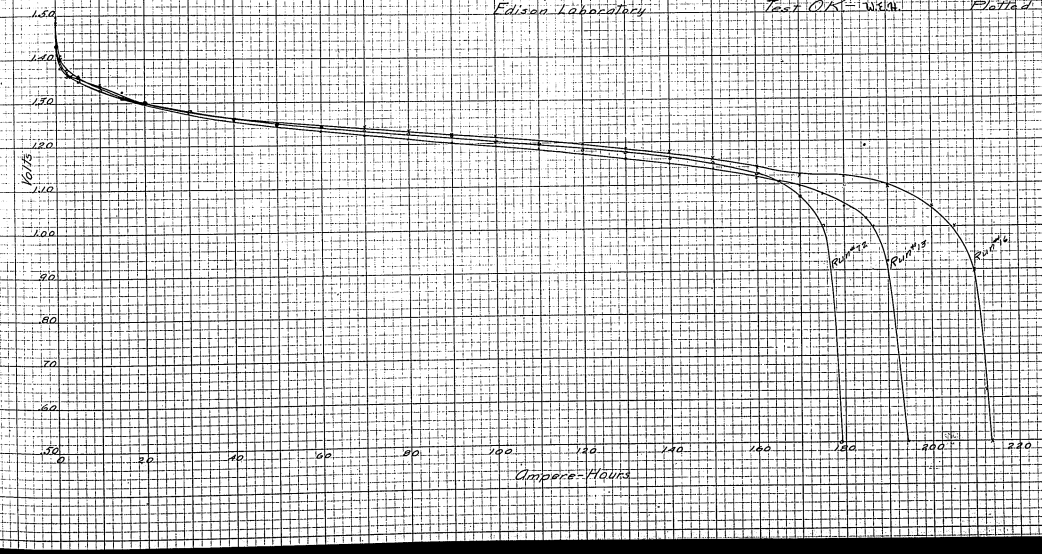
The discharged cell was washed with water (5 changes in 14 days) the water was then replaced with 21% KOH (5 changes in 7 days):

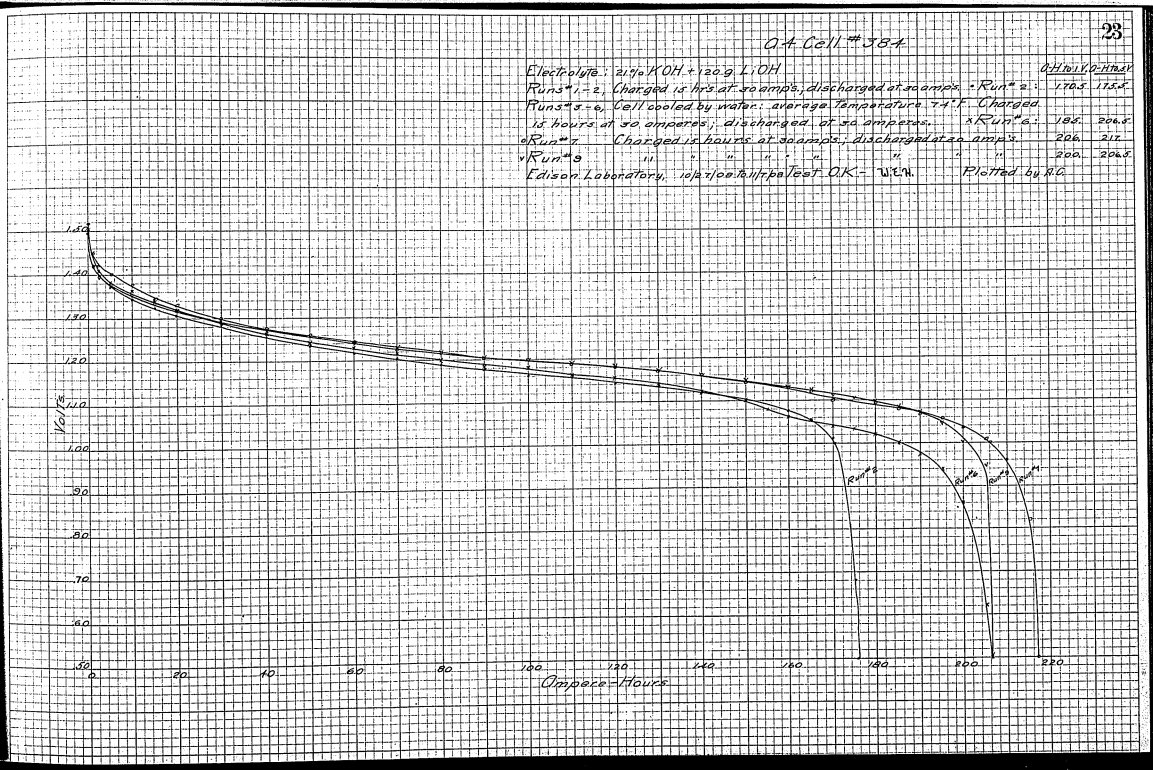
Run No 16 12/5/00	Charged 15 hours at 50 amps.; discharged at 50 amps.		205.	218.7

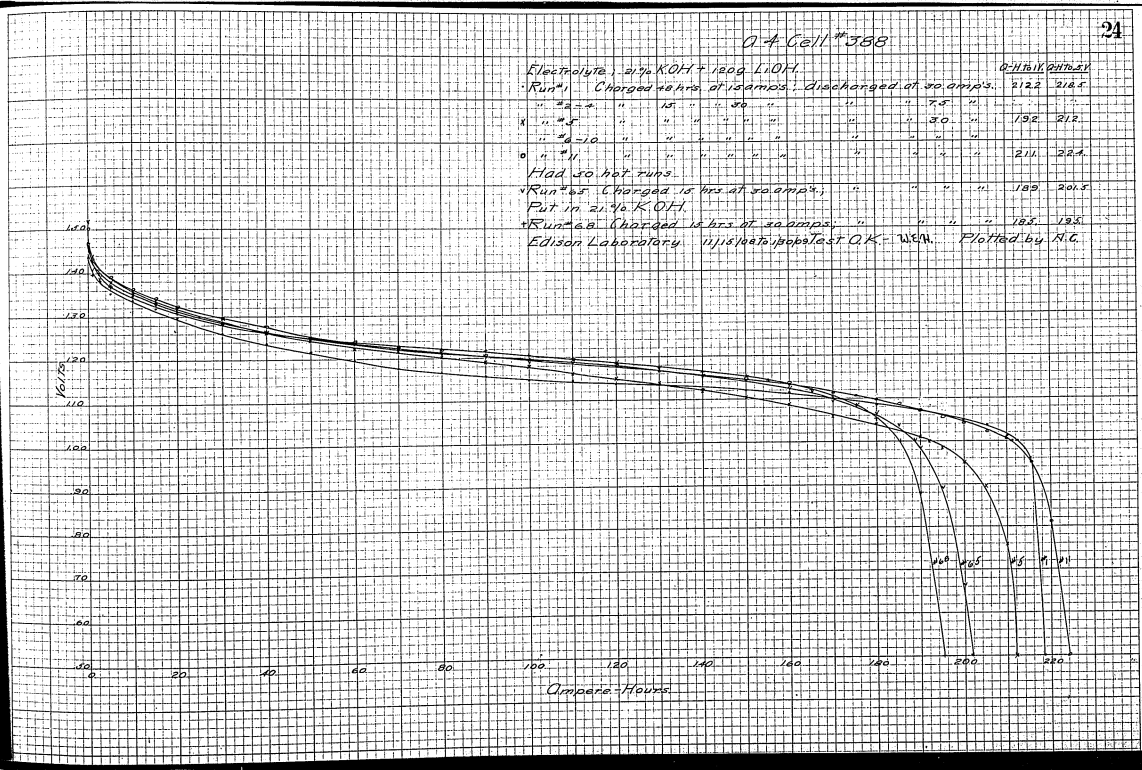
Had 50 hot runs — Temperature 150°F.

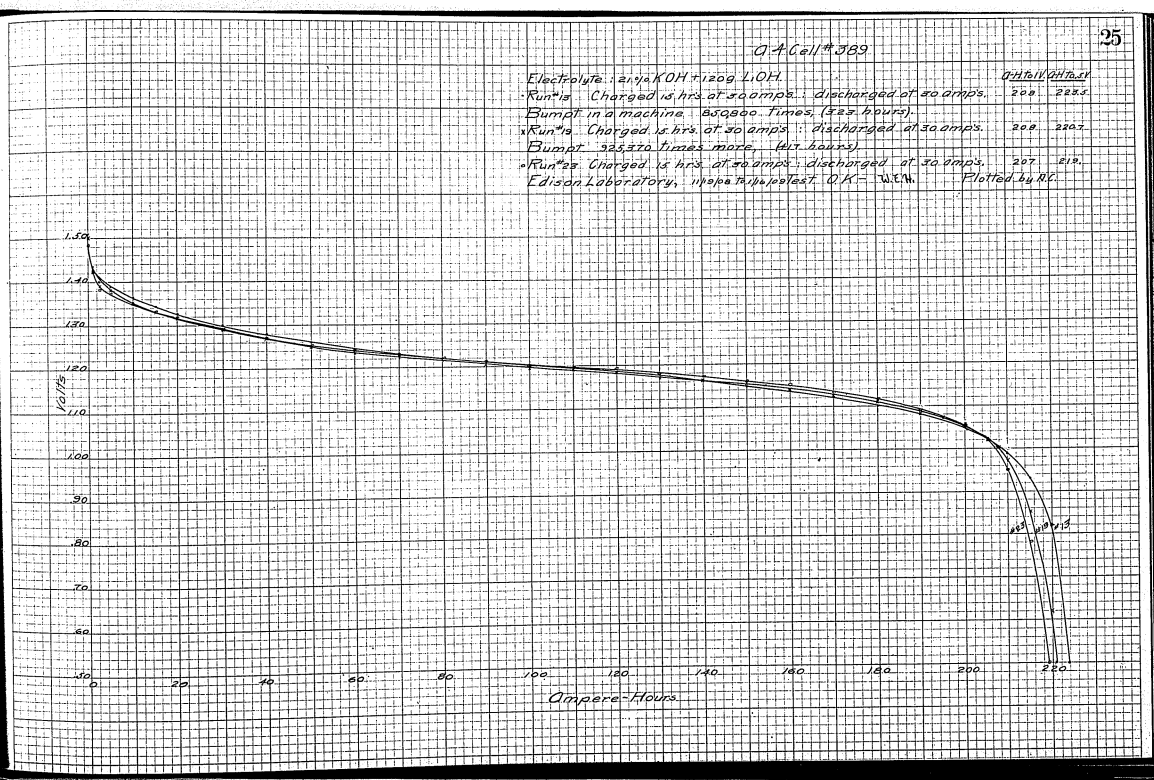
Run No 22 1/27/00	Charged 15 hours at 50 amps.; discharged at 50 amps		175.	179.

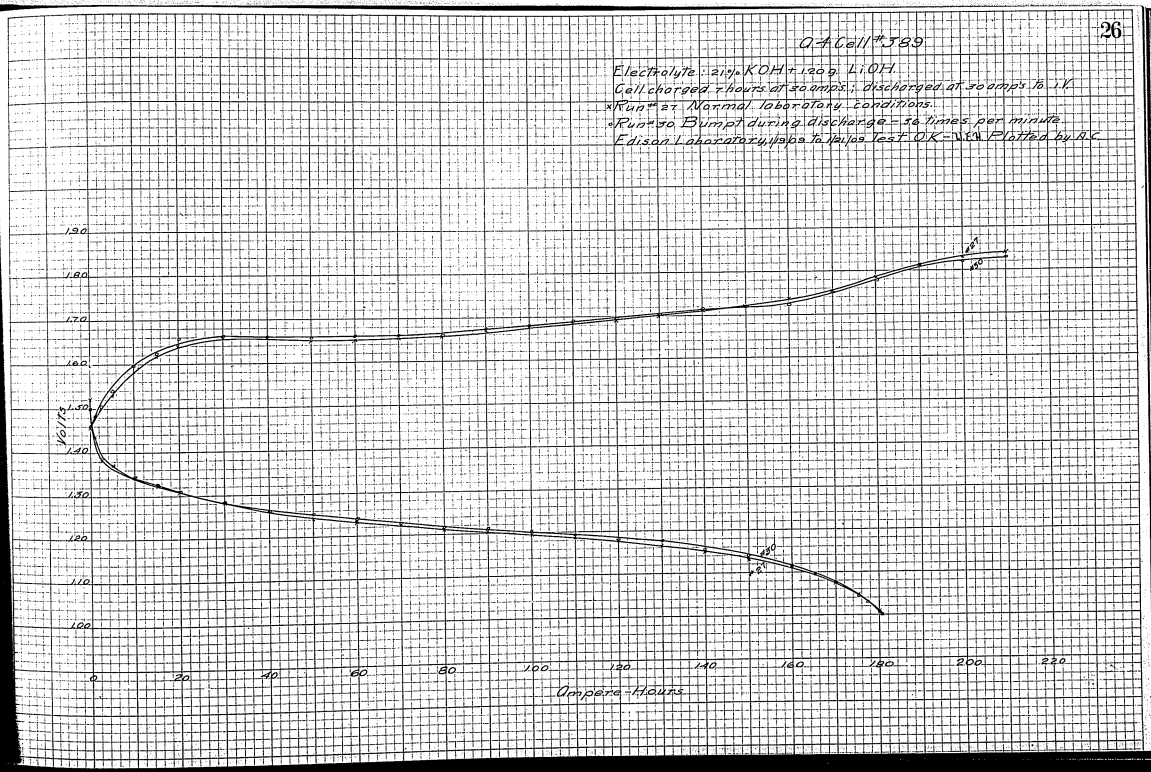
Edison Laboratory. Test OK — W.H.H. Plotted by A.C.




0.4 Cell #384
Electrolyte: 21% KOH + 20% LiOH
Runs #1, 2, Charged 15 hrs at 30 amps, discharged at 30 amps.
Runs #3-6, Cell cooled by water: average Temperature 74°F. Charged 15 hours at 30 amperes, discharged at 30 amperes.
Run #7 Charged 15 hours at 30 amps, discharged at 30 amps.
Run #8 " " " " " " " " "
Edison Laboratory, 10/27/00 Rail Type Test O.K. - W.E.H.
Plotted by R.C.
KOH Vol. % - Initial
Run #2: 170.5 115.5
Run #6: 185. 206.5
Run #7: 206. 217.
Run #8: 200. 206.5
Volts
Ampere-Hours
Run #2
Run #6
Run #7
Run #8


O-4 Cell #368
Electrolyte: 21% KOH + 120g LiOH.
Run #1 Charged 10 hrs. at 15 amps; discharged at 30 amps. 212.2 214.5
" #2-4 " 15 " 30 " " 7.5 " " "
x " #5 " " " " " " 3.0 " 192 212.
" #6-10 " " " " " " " " " "
o " #11 " " " " " " " " " 211 224.
Had 30 hot runs
Run #65 Charged 15 hrs at 30 amps. " " " " 189 201.5
Put in 21% KOH.
Run #68 Charged 15 hrs at 30 amps; " " " " 185 195.
Edison Laboratory 11/15/1870 Apparatus OK. W.E.H. Plotted by N.C.
Volts
Ampere-Hours
#68
#65
#5
#4
#11


O.A Cell #389
Electrolyte : 21% KOH + 120g LiOH.
O.H. to IV
O.H. to I
•Run #18 Charged 18 hrs. at 30 amps : discharged at 20 amps. 209 223.3
Bump! in a machine 85,980 Times, (323 hours).
x Run #19 Charged 18 hrs. at 30 amps : discharged at 30 amps. 208 220.7
Bump! 925,370 times more, (417 hours).
∘ Run #23 Charged 18 hrs. at 30 amps : discharged at 30 amps. 207 219.
Edison Laboratory, 11/19/28 to 11/26/28 Test O.K. — W.E.M.
Plotted by R.C.
Volts
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours

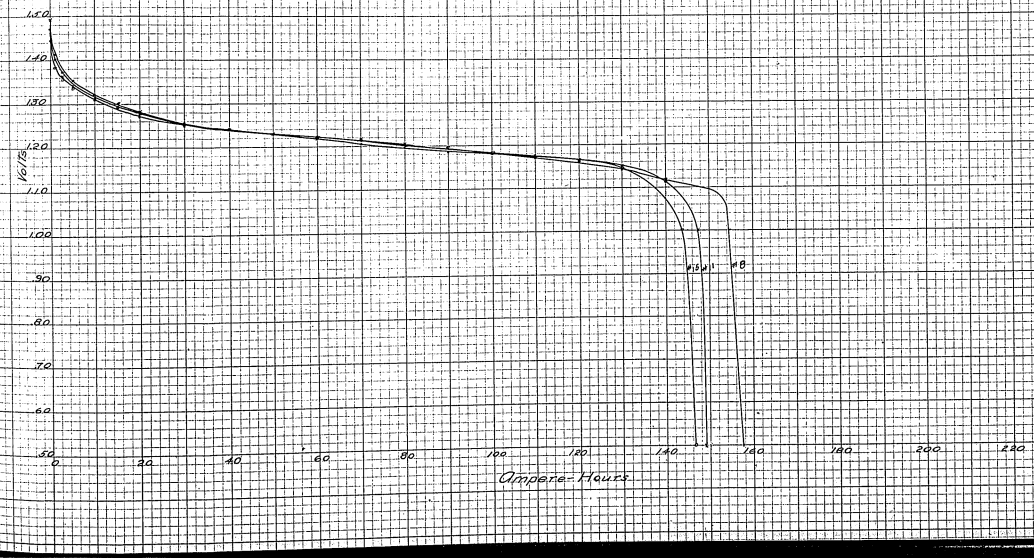

O-A Cell #389
Electrolyte: 21% KOH + 1.20g LiOH
Cell charged 7 hours at 20 amps; discharged at 30 amps to 1V.
*Run #27 Normal laboratory conditions.
*Run #30 Bump during discharge - 36 times per minute.
Edison Laboratory 1/19/30 to 1/21/30 test OK - VEM Plotted by RC
Volts
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours
#27
#30

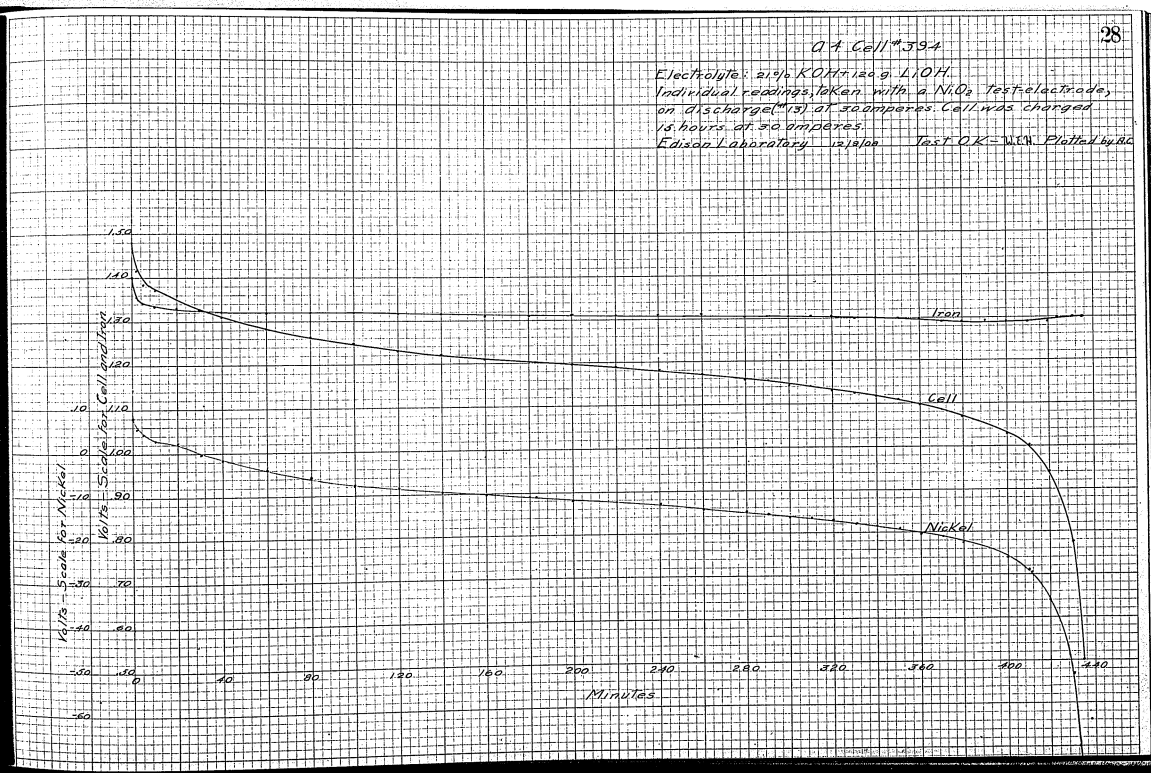
O-H Cell #393

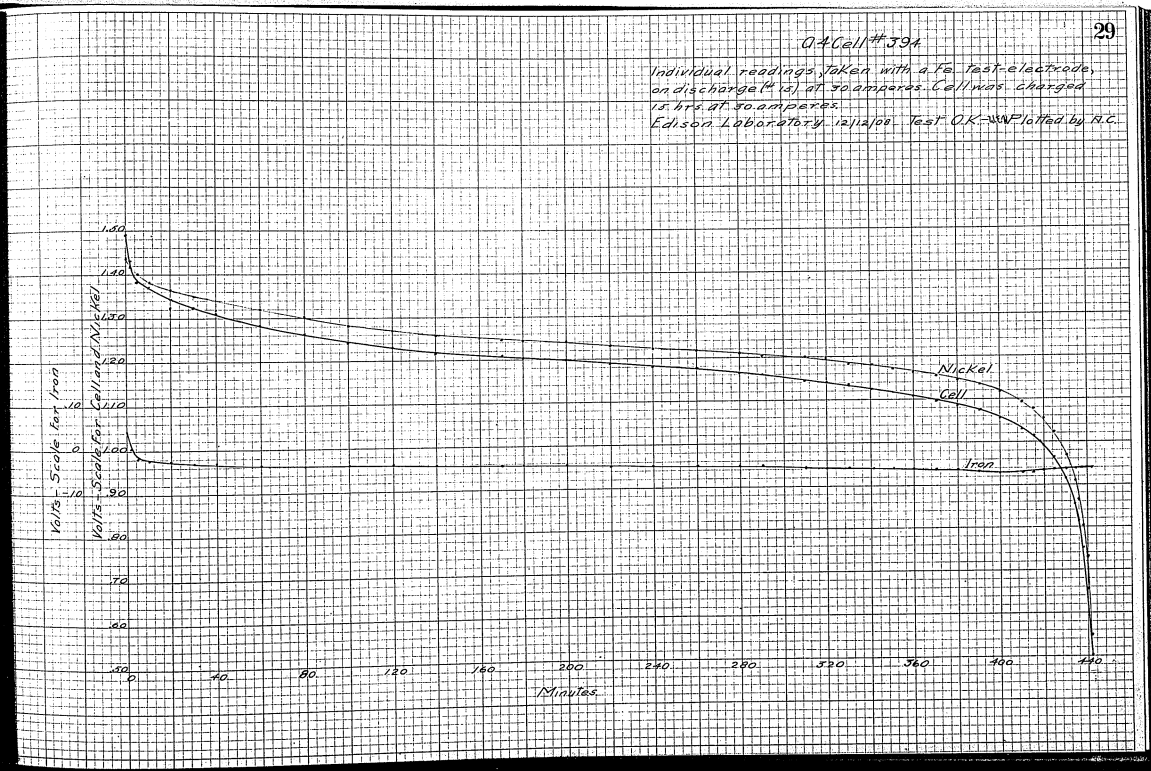
Electrolyte: 21% KOH + 15g LiOH

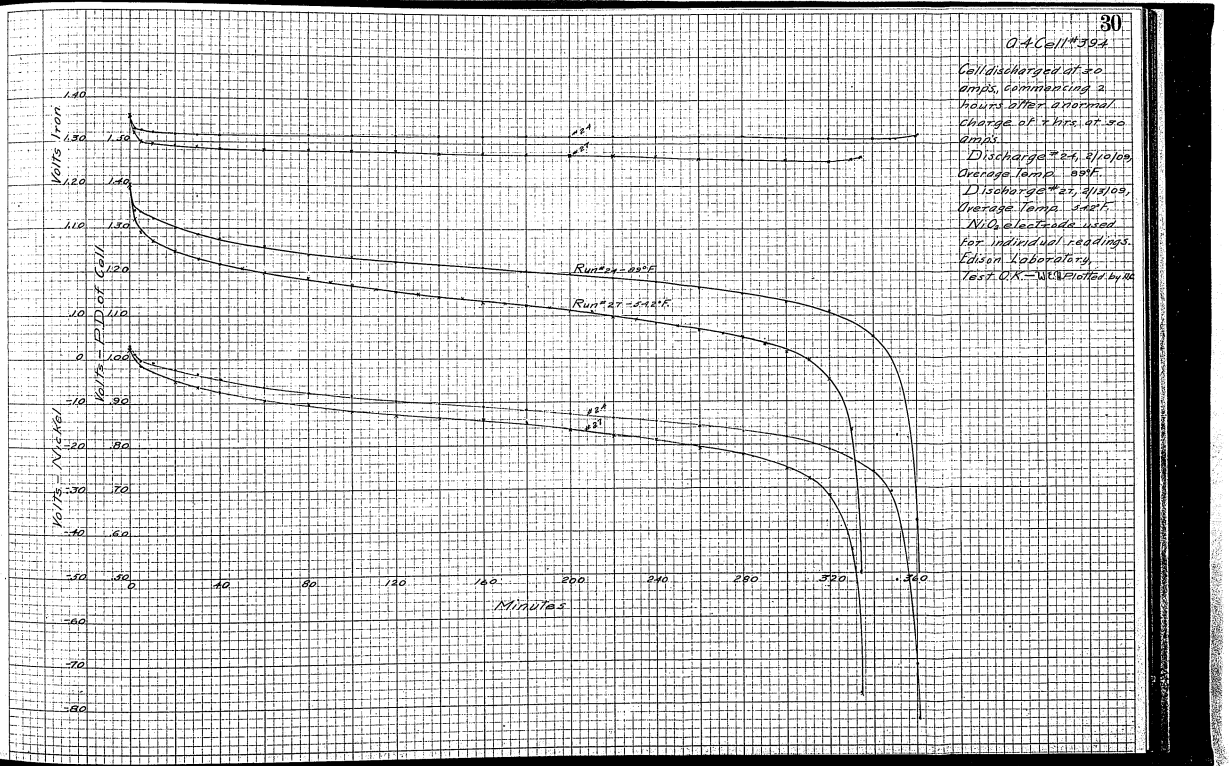
	O-H No. 11	O-H No. 34
Run #8 Charged 15 hours at 30 amps., discharged at 30 amps.	164.5	157.7
Bumpt in a machine 31,600 times. (205 hours)		
" #11 Charged 15 hours at 30 amps., discharged at 30 amps.	147.5	144
Bumpt in a machine 106,240 times. (711 hours)		
" #15 Charged 15 hours at 30 amps., discharged at 30 amps.	143.5	146.5

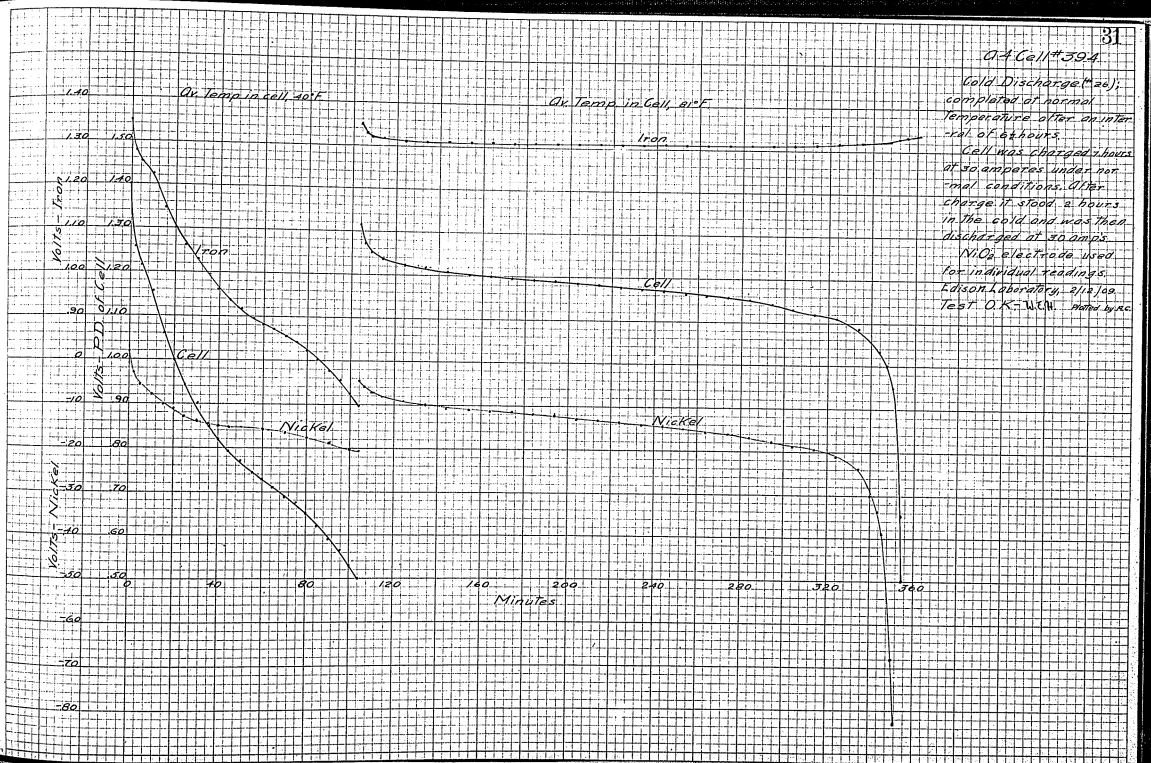
Edison Laboratory 12/2/08 To 11/6/09. Test O.K.- W.E.H. Plotted by R.C.




A 4 Cell #394
Electrolyte: 21% KOH + 126 g. LiOH.
Individual readings, taken with a Ni_2O_3 Test-electrode,
on discharge (#13) at 30 amperes. Cell was charged
13 hours at 30 amperes.
Edison Laboratory 12/8/08 Test OK - W.H.N. Plotted by BC
Iron
Cell
Nickel
Volts - Scale for Nickel
Volts - Scale for Cell and Iron
Minutes
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
.30
.10
0
-10
-20
-30
-40
-50
-60
0
40
80
120
160
200
240
280
320
360
400
440


0.4 Cell #394
Individual readings, taken with a Fe. test electrode, on discharge (#13) at 30 amperes. Cell was charged 15 hrs. at 30 amperes.
Edison Laboratory 12/12/08 Test O.K. Plotted by H.C.
Volts - Scale for Cell and Nickel
Volts - Scale for Iron
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
.10
0
-.10
0
40
80
120
160
200
240
280
320
360
400
440
Minutes
Nickel
Cell
Iron


O.A. Cell #392
Cell discharged at 30 amps, commencing 2 hours after normal charge of 7 hrs. at 30 amps.
Discharge #24, 2/10/09, Average Temp. 85°F.
Discharge #27, 2/13/09, Average Temp. 112°F.
NiO2 electrode used for individual readings.
Edison Laboratory.
Test O.K. — W.T.B. Plotted by H.C.
Volts Iron
Volts — P.D. of Cell
Volts — Nickel
Run #24 — 85°F.
Run #27 — 112°F.
#2A
#2B
Minutes
1.40
1.30
1.20
1.10
1.0
.0
-.10
-.20
-.30
-.40
-.50
-.60
-.70
-.80
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
40
80
120
160
200
240
280
320
360



O-1 Cell #394

Cold Discharge (#22); completed at normal temperature after an interval of 6 hours.

Cell was charged 4 hours at 30 amperes under normal conditions. After charge it stood 2 hours in the cold and was then discharged at 30 amps.

NiO_2 electrode used for individual readings.

Edison Laboratory, 2/13/09.

Test O.K. - W.C.H. Plotted by R.C.

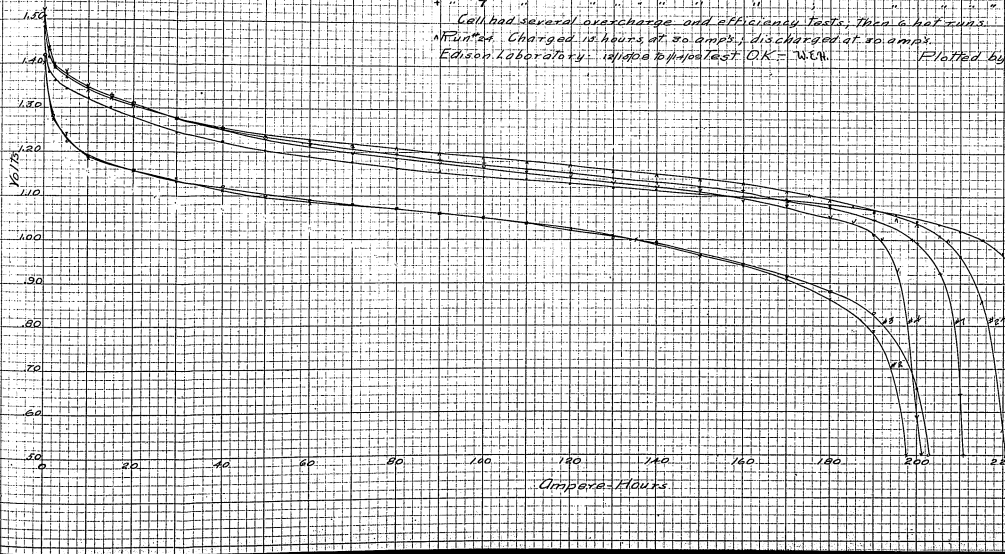
A + Cell #393

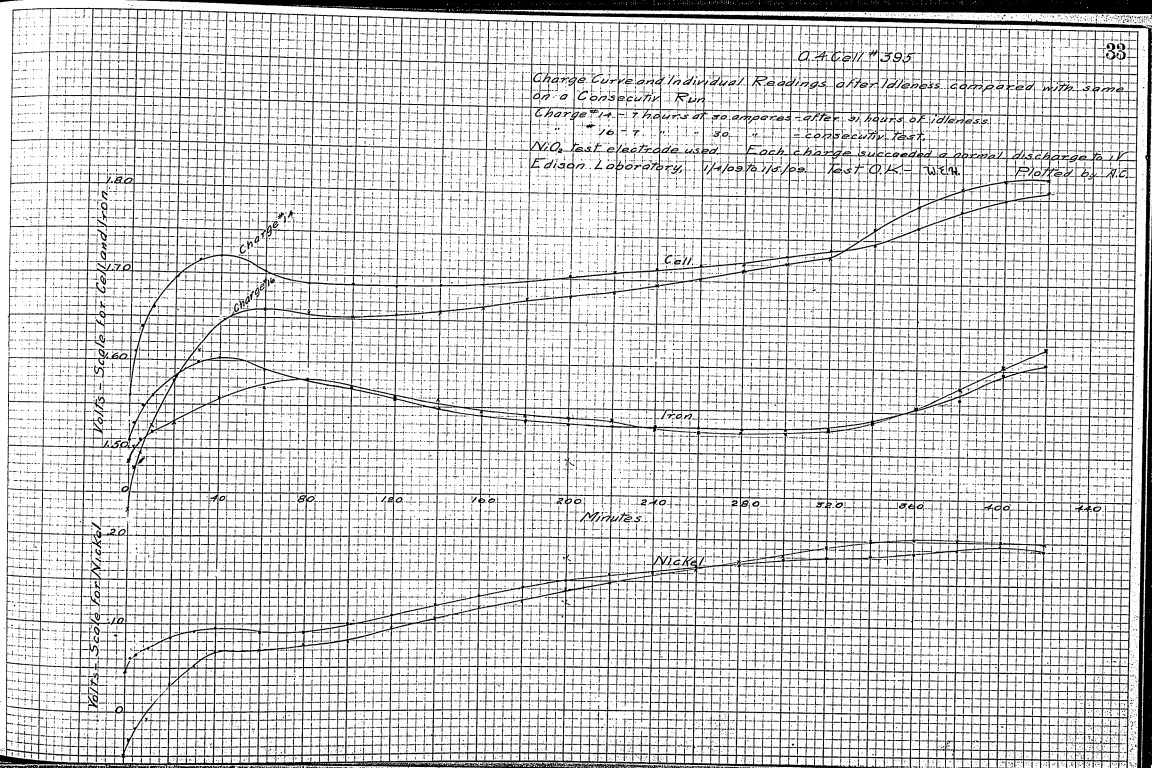
Electrolyte: 21% KOH + 120 g. LiOH.

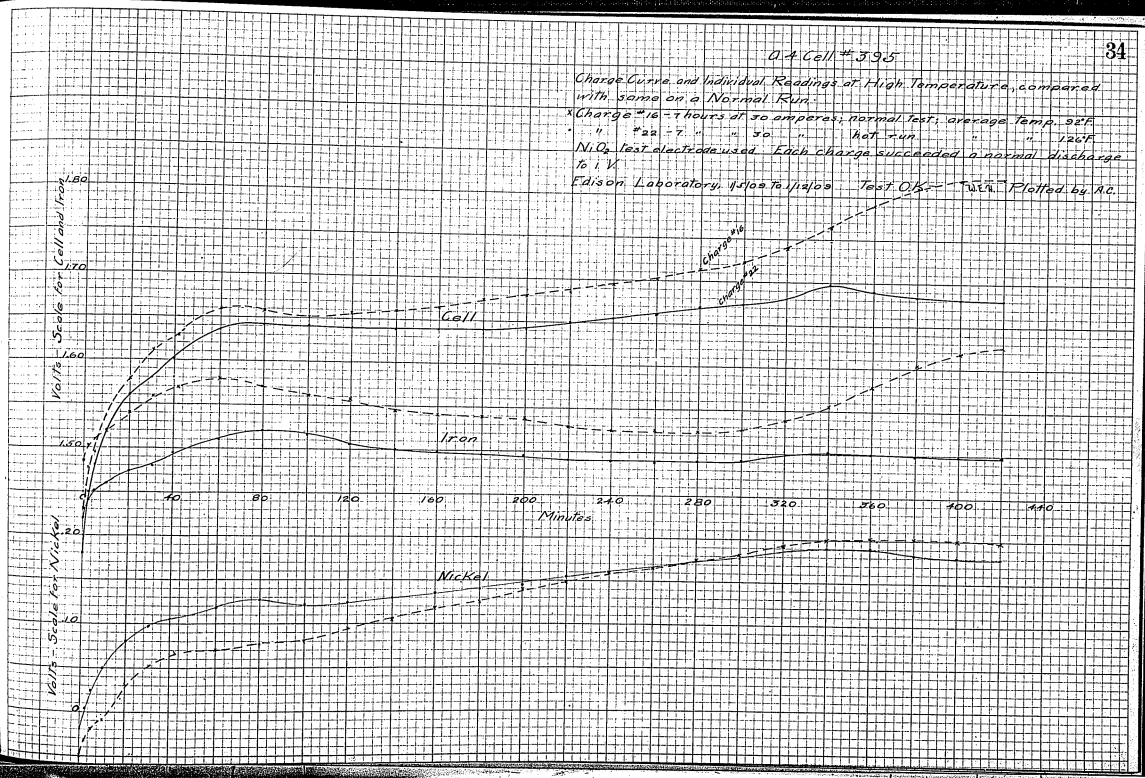
	AHr.	AHr.
• Run #1. Charged 24 hrs. at 15 amps; discharged at 50 amperes.	215.	228.7
On the next five runs, cell was in air for the high-rate part of charge, and in cooling water for the low-rate part, then in air again for the discharge.		
× Run #2. Charged 14 hrs. at 60 amps. 16 hrs. at 15 amps; discharged at 60 amps.	138.	197.5
○ " #3 " " " " " " " " "	137.	206.5
▽ " #4 " 14 " " 30 " (normally); " " 30 "	191.5	201.
+ " #7 " " " " " " " " " " "	199.	210.7
Cell had several overcharge and efficiency tests; This is not run.		
∧ Run #24. Charged 15 hours at 30 amps; discharged at 30 amps.	207.	220.5

Edison Laboratory. Made to this test. O.K. — W.E.M.

Plotted by R.C.




O.A. Cell #395
Charge Curve and Individual Readings after Idleness compared with same on a Consecutive Run
Charge #14 - 7 hours at 30 amperes - after 31 hours of idleness
" #16 - 7 " " 30 " " consecutive test.
NiO2 test electrode used. Each charge succeeds a normal discharge to 1V
Edison Laboratory. 1/4/09 to 1/8/09. Test O.K. - W.C.H.
Plotted by A.C.
Charge #1
Charge #14
Cell
Iron
Nickel
Volts - Scale for Cell and Iron
Volts - Scale for Nickel
Minutes
1.80
1.70
1.60
1.50
0
.20
.10
0
40
80
120
160
200
240
280
320
360
400
440


O.A. Cell #3.95
Charge Curve and Individual Readings at High Temperature, compared with same on a Normal Run.
Charge #16 - 7 hours at 30 amperes; normal test; average Temp. 92°F.
" #22 - 7 " " 30 " hot run " " 126°F.
Ni_2O_3 test electrode used. Each charge succeeded a normal discharge to 1 V.
Edison Laboratory, 1/5/06 To 1/12/06 Test O.K.— W.C.A. Plotted by R.C.
Volts - Scale for Cell and Iron
1.80
1.70
1.60
1.50
Charge #16
Charge #22
Cell
Iron
40
80
120
160
200
240
280
320
360
400
440
Minutes
Volts - Scale for Nickel
.20
.10
0
Nickel

A-4 Cell # 596

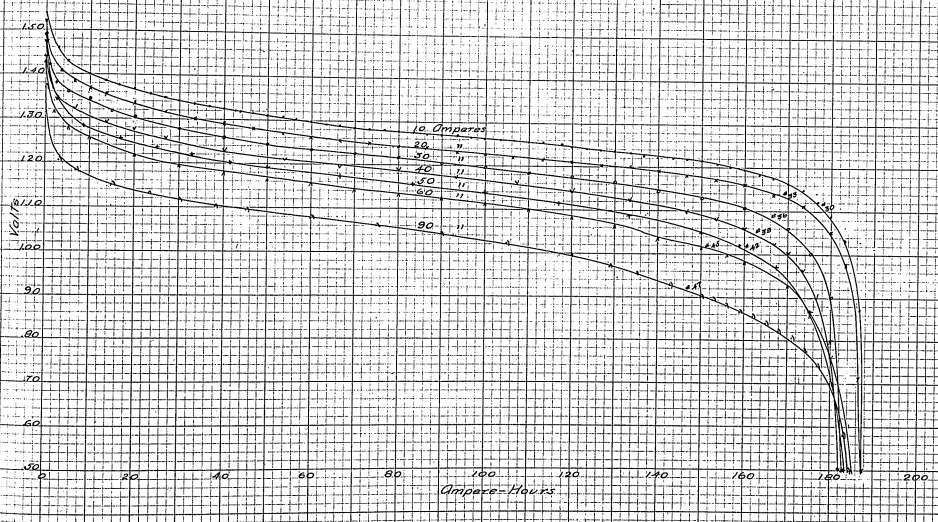
Discharges at Various Rates - the charge being constantly 7 hours at 30 amperes

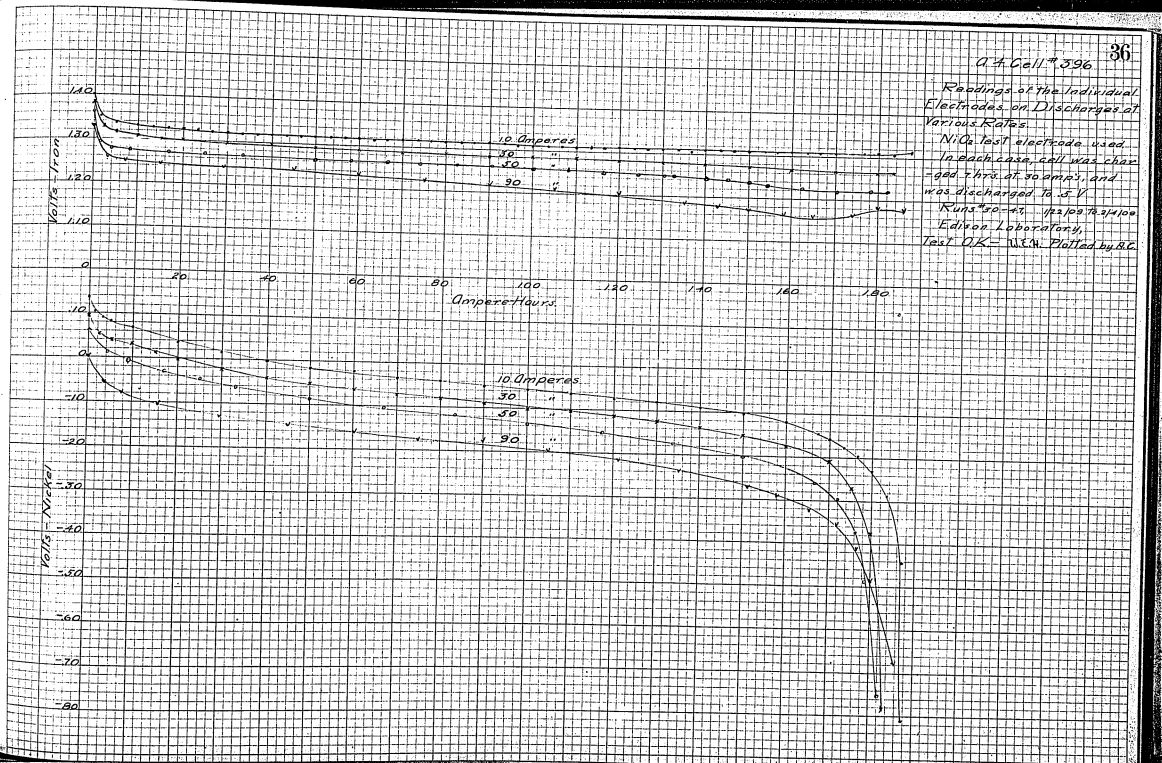
Three runs at each rate (except at 30 amperes) were made, the last being used here in plotting.

Electrolyte: 21% KOH + 120 grams LiOH

Runs # 30-47. 1/22/00 to 2/4/00.

Edison Laboratory. Test O.K. - W.H. Plotted by A.C.





A.4 Cell #396

Readings of the Individual Electrodes on Discharges at Various Rates.

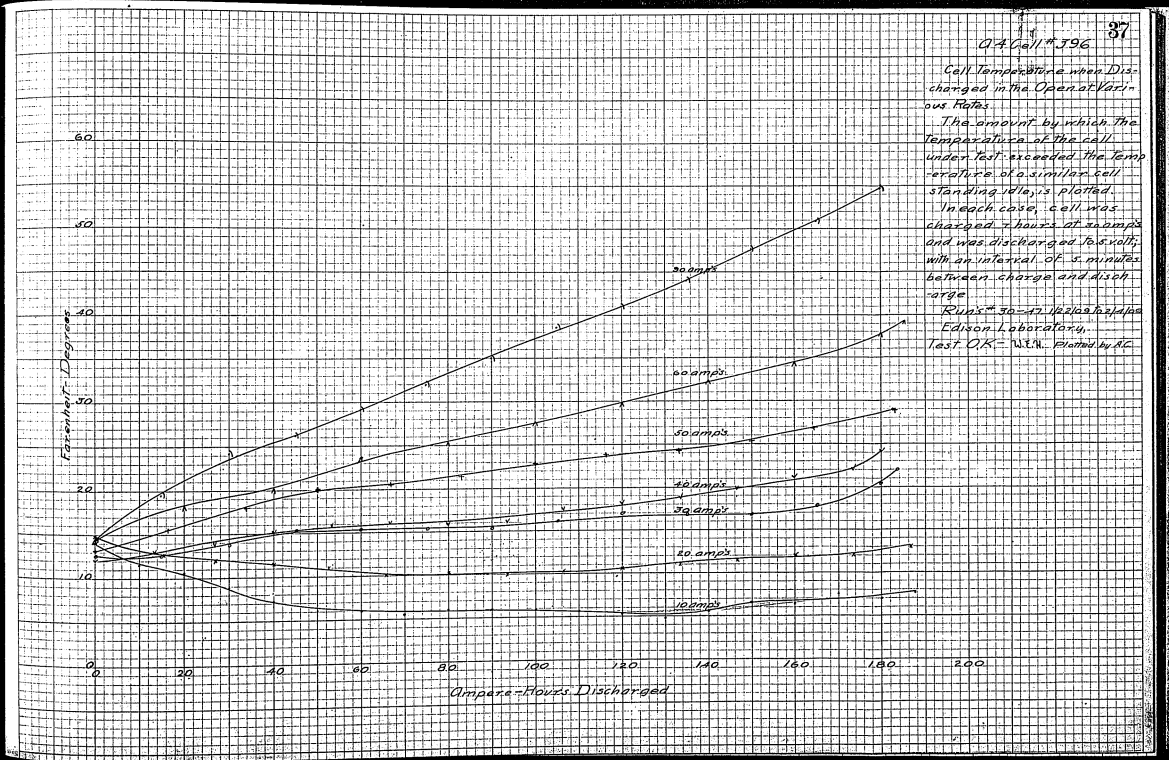
NiO2 test electrode used.

In each case, cell was charged thru at 30 amps. and was discharged to 1.5 V.

Runs #90-97. 12/23/08 to 2/4/09

Edison Laboratory,

Test OK— W.E.N. Plotted by B.C.



04 Cell # 396

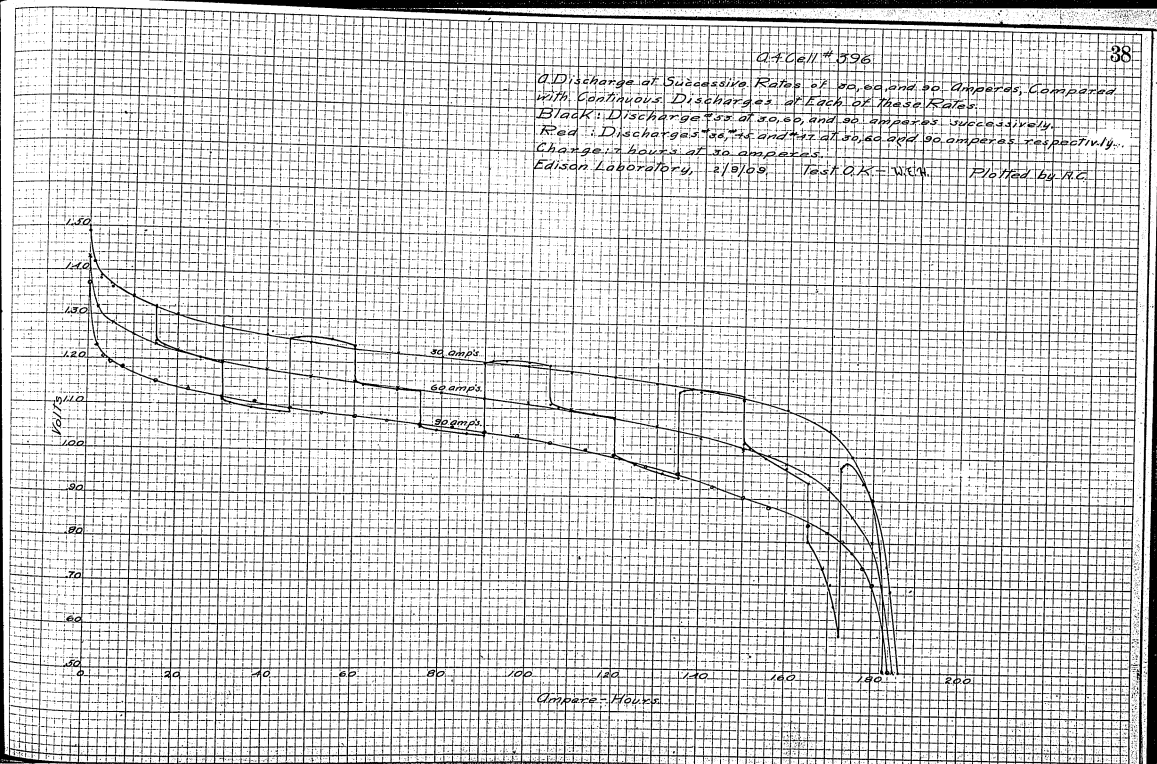
Cell Temperature when Discharged in the Open at Various Rates.

The amount by which the temperature of the cell under test exceeded the temperature of a similar cell standing idle, is plotted.

In each case, cell was charged 7 hours at 10 amps and was discharged to 5 volts, with an interval of 5 minutes between charge and discharge

Runs # 30-19 Rec'd at the Edison Laboratory.

Test OK - W.E.H. Plotted by R.C.


A.4 Cell # 396
A Discharge at Successive Rates of 30, 60, and 90 Amperes, Compared with Continuous Discharges at Each of These Rates.
Black: Discharges #33 of 30, 60, and 90 amperes successively.
Red: Discharges #36, #38 and #41 at 30, 60 and 90 amperes respectively.
Charge: 7 hours at 30 amperes.
Edison Laboratory, 2/9/09 Test O.K. - W.E.M. Plotted by R.C.
30 amps
60 amps
90 amps
Volts
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
Ampere-Hours

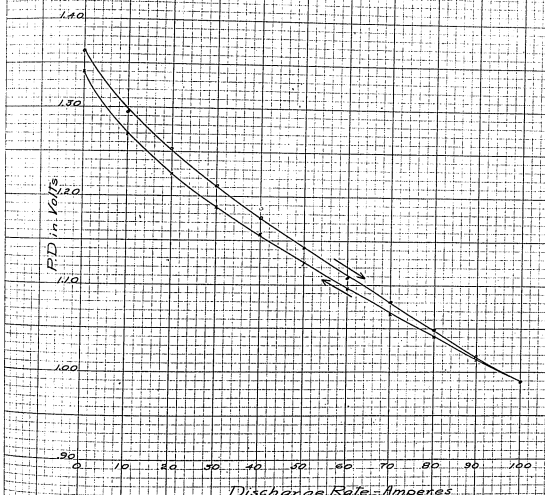
O-A Cell #396

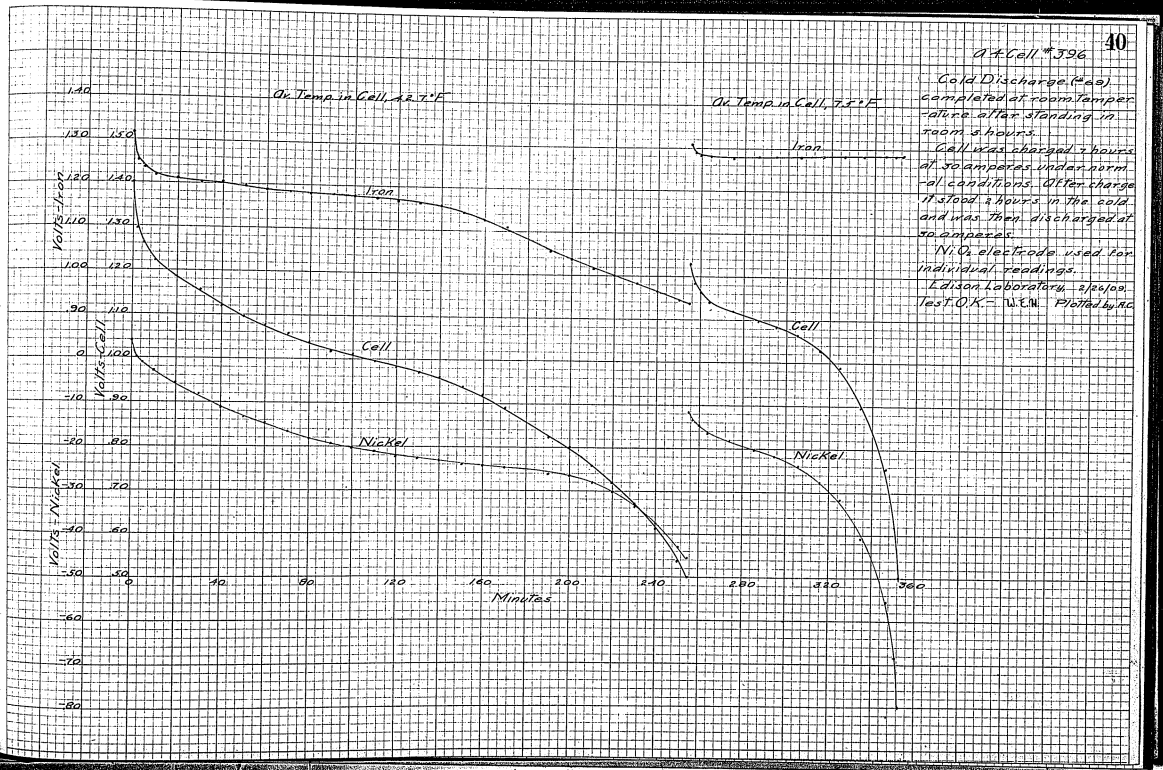
Average Potential Difference at Various Rates of Current Delivery: The Temporary reading at Terminals of a half-discharged cell when the current is increasT. by steps and reduced again.

Run #55, 2/10/09. Charge: 7 hours at 30 amps. Cell was discharged 80 ampere-hours at 30-ampere rate before starting readings for this curve.

Cell Temperature: 90°F.

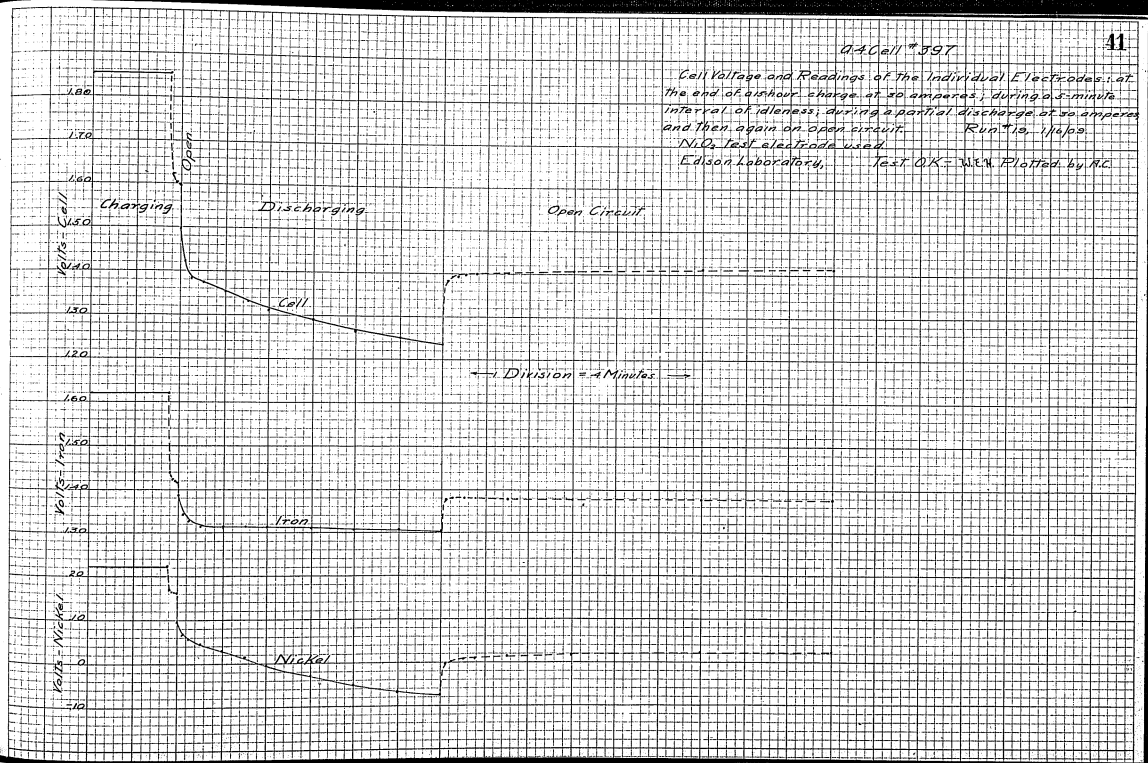
Edison Laboratory. Test O.K.— W.C.W. Plotted by A.C.

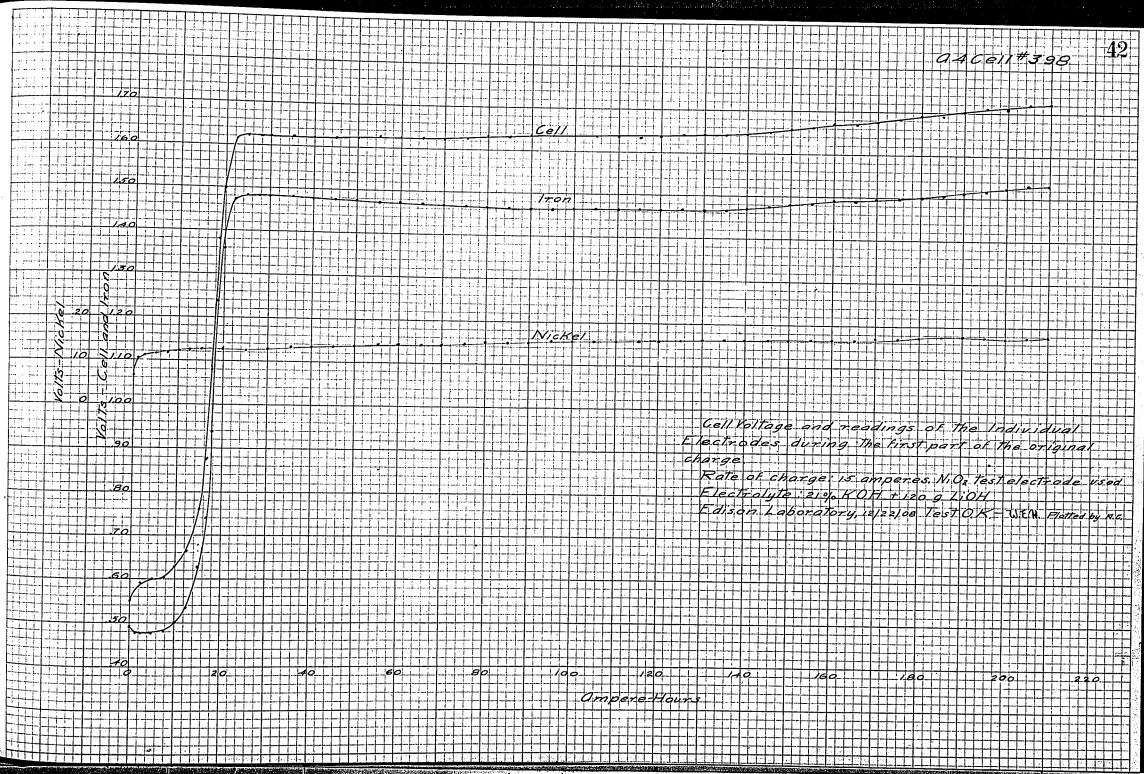




A.K. Cell #396

Cold Discharge. (#29)
completed at room Temperature after standing in room 8 hours.
Cell was charged 7 hours at 30 amperes under normal conditions. After charge it stood 2 hours in the cold and was then discharged at 30 amperes.
Ni. O. electrode used for individual readings.
Edison Laboratory 2/20/09.
Test O.K. – W.E.N. Plotted by R.C.


Cell Voltage and Readings of the Individual Electrodes: at the end of a 1 hour charge at 30 amperes; during a 5 minute interval of idleness; during a partial discharge at 30 amperes and then again on open circuit. Run #19, 1/16/09.
Ni O2 test electrode used.
Edison Laboratory, Test O.K. - W.E.H. Plotted by H.C.
0-4 Cell #397
Open
Charging
Discharging
Open Circuit
Cell
Volts - Cell
1.80
1.70
1.60
1.50
1.40
1.30
1.20
← 1 Division = 4 Minutes →
Iron
Volts - Iron
1.60
1.50
1.40
1.30
Nickel
Volts - Nickel
.20
.10
0
-.10

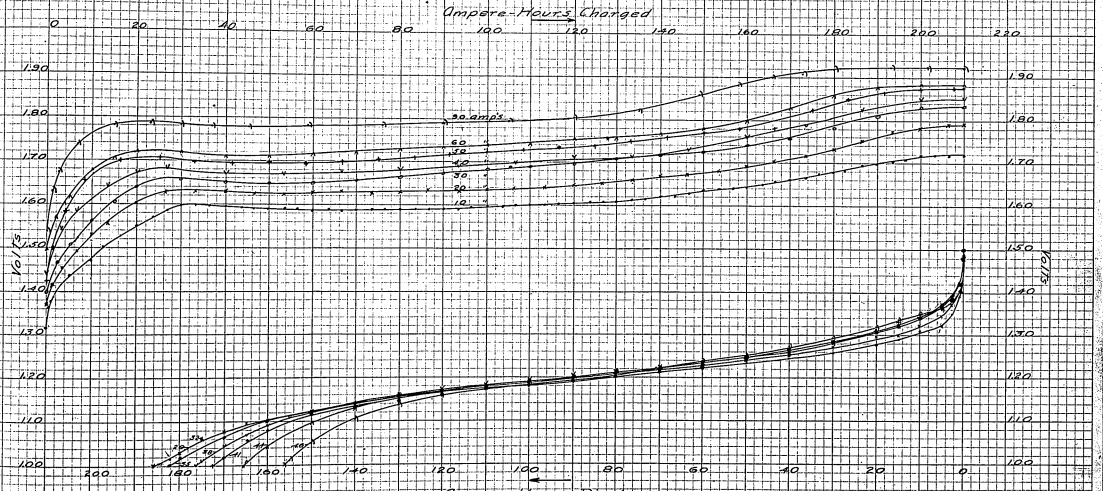

A.A. Cell #398.
Cell
Iron
Nickel
Volts-Nickel
Volts-Cell and Iron
Ampere-Hours
170
160
150
140
130
120
110
100
90
80
70
60
50
40
20
10
0
10
20
40
60
80
100
120
140
160
180
200
220
Cell Voltage and readings of the Individual Electrodes during the first part of the original charge.
Rate of charge: 15 amperes. N.O. Test electrode used.
Electrolyte: 21% KOH + 120 g LiOH
Edison Laboratory, 12/22/08 Test O.K. W.E.H. Plotted by R.C.

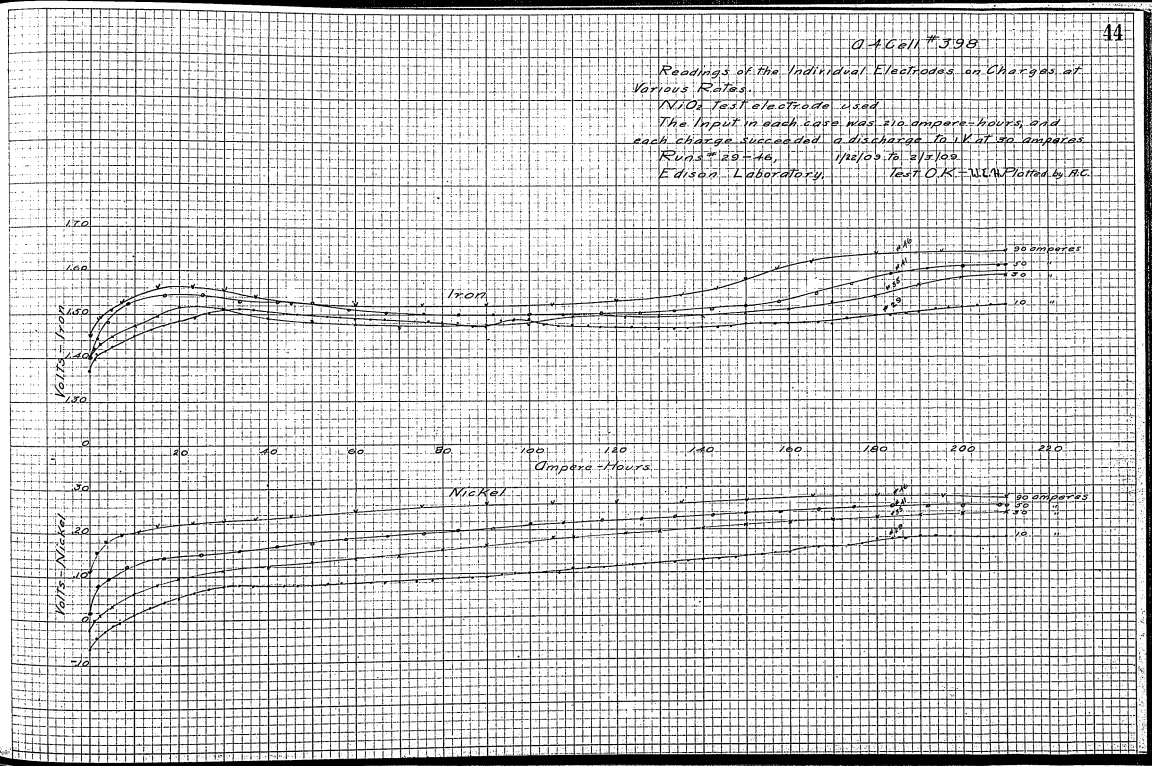
O.A. Cell #399

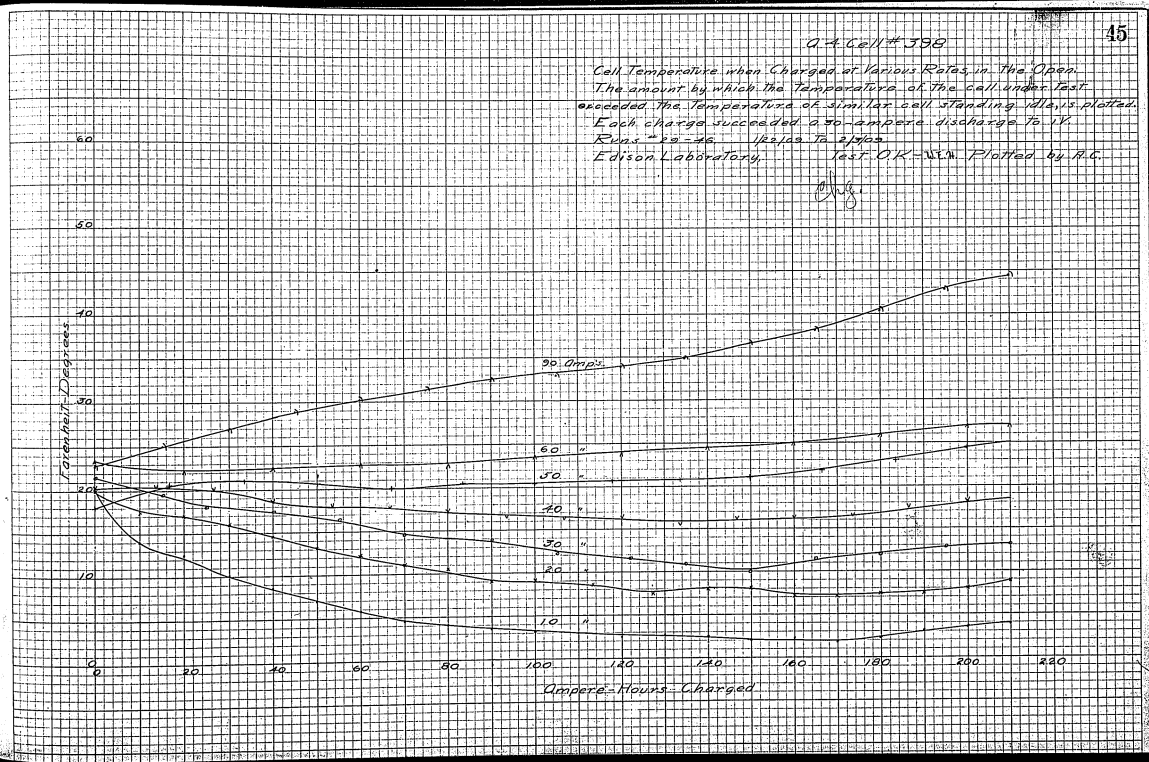
Efficiency Tests at Various Rates of Charge and Constant Rate of Discharge, always putting in 210 ampere-hours, and discharging at 30 amperes to 1V.

Edison Laboratory, 1/29/00 to 2/8/00 Test OK — U.E.N. Planed by R.C.

Run	Charge			Av. Voltage		Output		Efficiencies		
				Charge	Discharge	Amp-hr	Watt-hr	Amp-hr	Volt	Watt-hr
•	29	21 hrs.	@ 10 amp.	1.604	1.182	180.	220.0.	86.6	75.6	65.2
X	32	102	" - 20 "	1.653	1.193	190.	222.0	88.8	72.2	63.9
O	35	7	" - 30 "	1.692	1.197	182.5	218.4	86.8	70.7	61.4
V	38	54	" - 40 "	1.713	1.202	176.2	212.0	83.8	70.2	58.8
+	41	43	" - 50 "	1.742	1.209	172.5	207.5	82.1	69.1	56.7
^	44	33	" - 60 "	1.758	1.207	165.7	198.9	78.8	68.6	54.1
>	46	23	" - 90 "	1.822	1.213	156.5	190.0	74.5	66.6	49.6

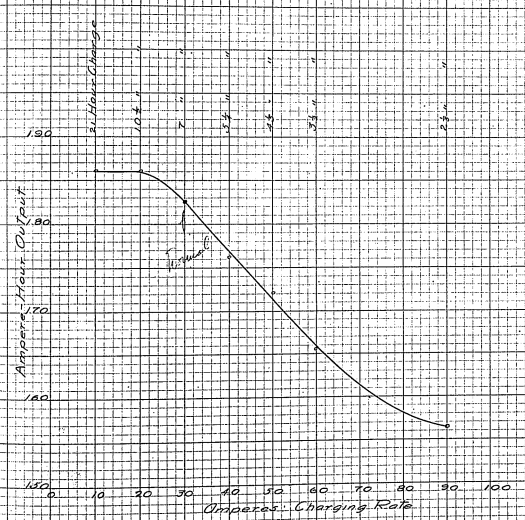


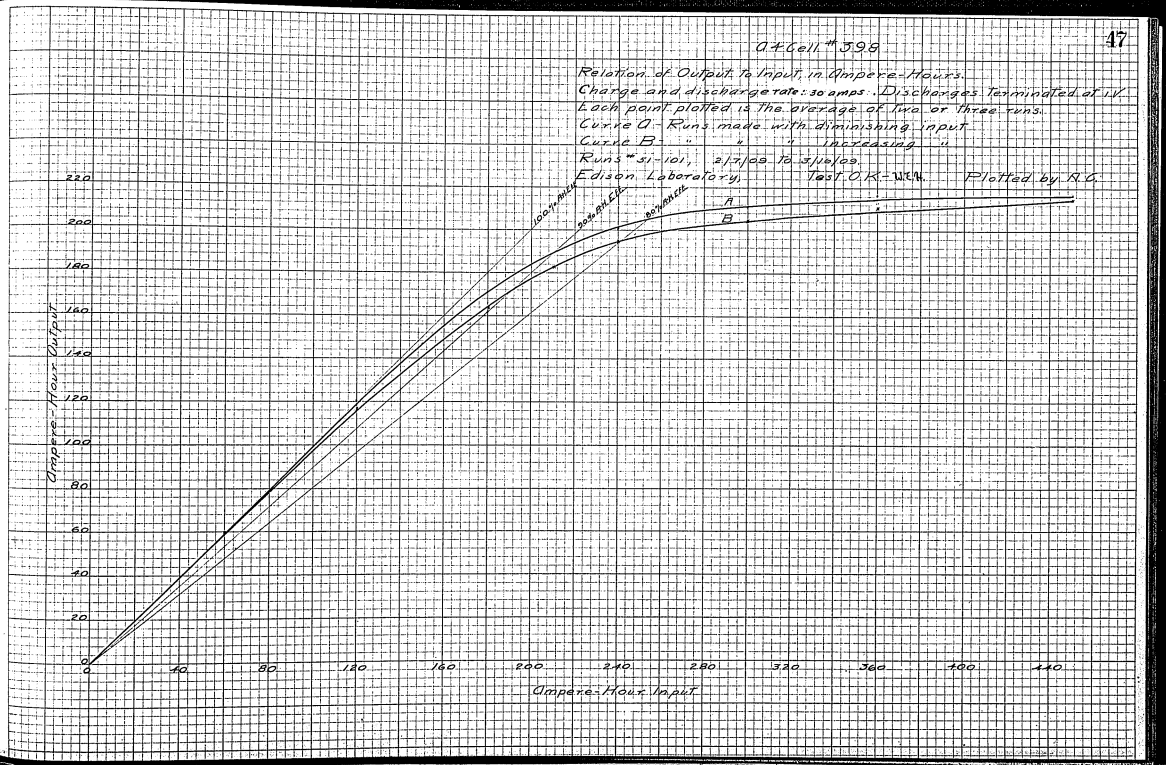

O-4 Cell #398
Readings of the Individual Electrodes on Charges at Various Rates.
Ni_2O_3 Test electrode used
The Input in each case was 210 ampere-hours, and each charge succeeded a discharge to 1V at 30 amperes.
Runs #129-46, 1/12/09 to 2/5/09.
Edison Laboratory, Test O.K.-W.L.A. Plotted by A.C.
Iron
Volts-Iron
Nickel
Volts-Nickel
Ampere-Hours
90 amperes
50 "
30 "
10 "
1.70
1.60
1.50
1.40
1.30
30
20
10
0
-10
0
20
40
60
80
100
120
140
160
180
200
220

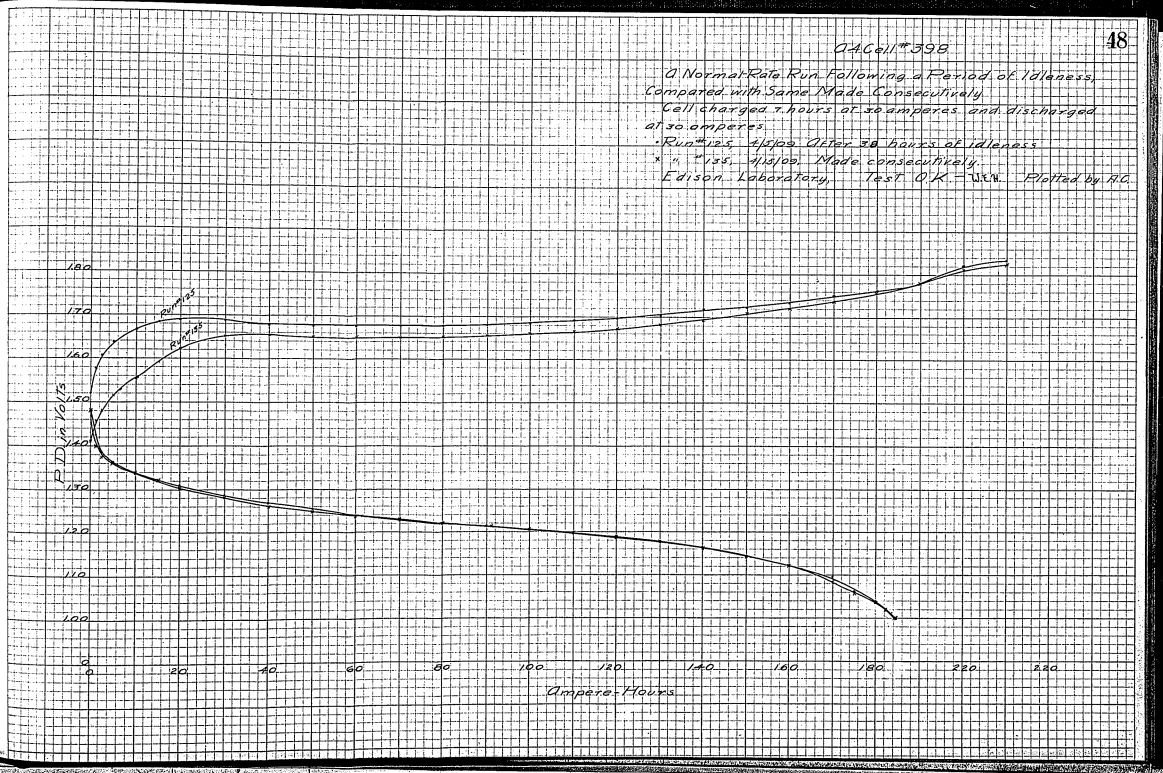

A.A. Cell #398
Cell Temperature when Charged at Various Rates, in the Open.
The amount by which the temperature of the cell under test
exceeded the temperature of similar cell standing idle, is plotted.
Each charge succeeded a 30-ampere discharge to 1V.
Runs #20-46. 12/10/18 to 2/1/19.
Edison Laboratory, Test OK-WN Plotted by A.C.
Fahrenheit Degrees
Ampere-Hours Charged
30 Amps.
60 "
50 "
40 "
30 "
20 "
10 "
0
10
20
30
40
50
60
0
20
40
60
80
100
120
140
160
180
200
220

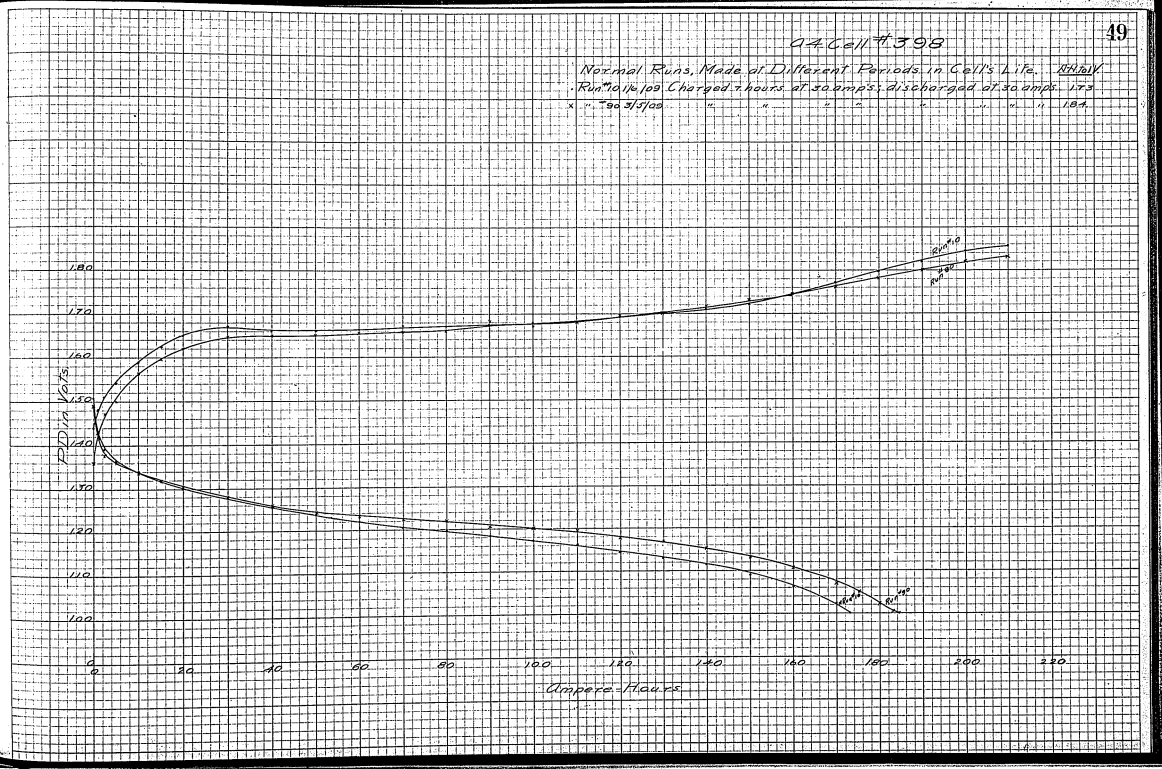
O.A. Cell #398

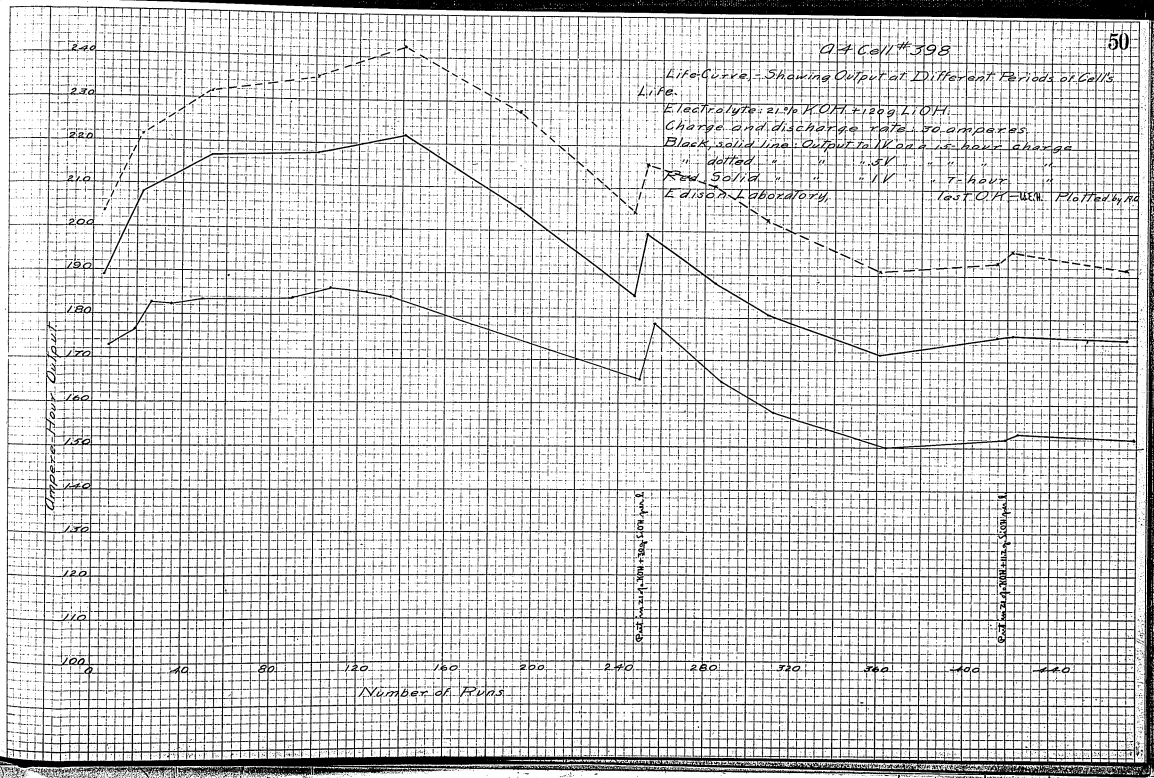
Ampere-Hour Output as a Function of the Charge Rate.
The Input in each case was 210 ampere-hours, and cell was discharged to 1.V at 30 amperes.
Runs #29-46
Edison Laboratory. Test O.K.-W.E.M. Plotted by R.C.

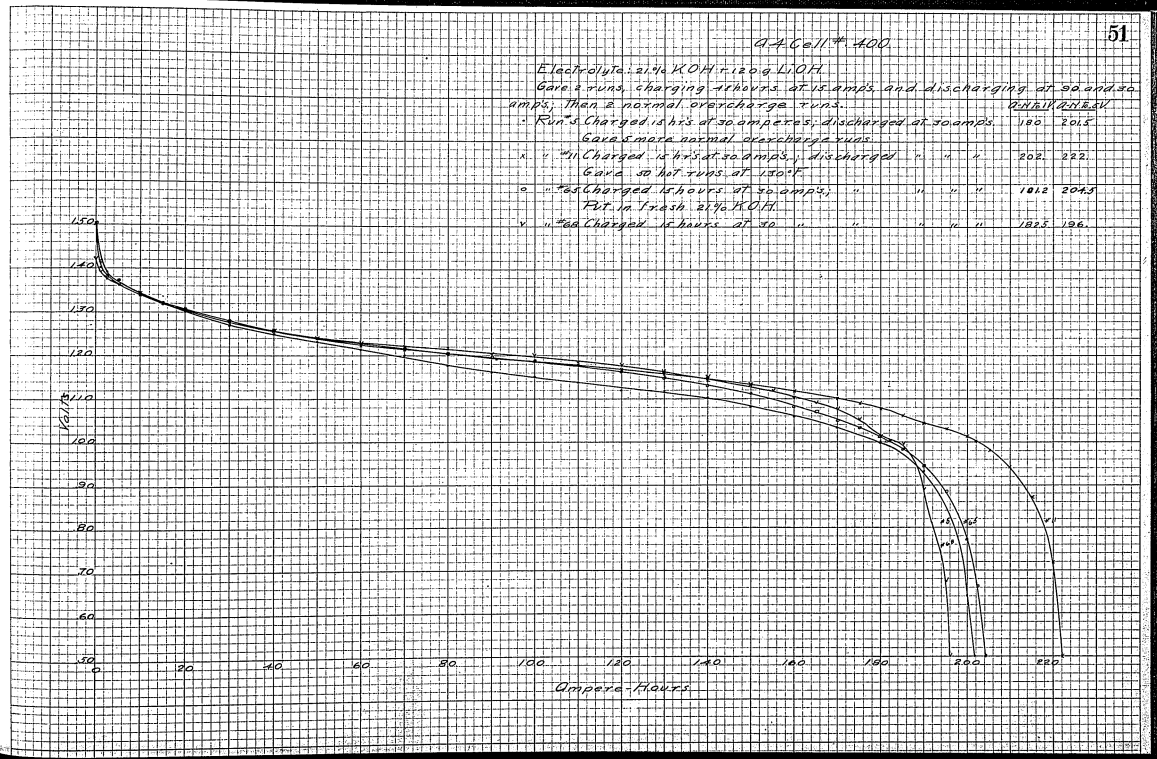


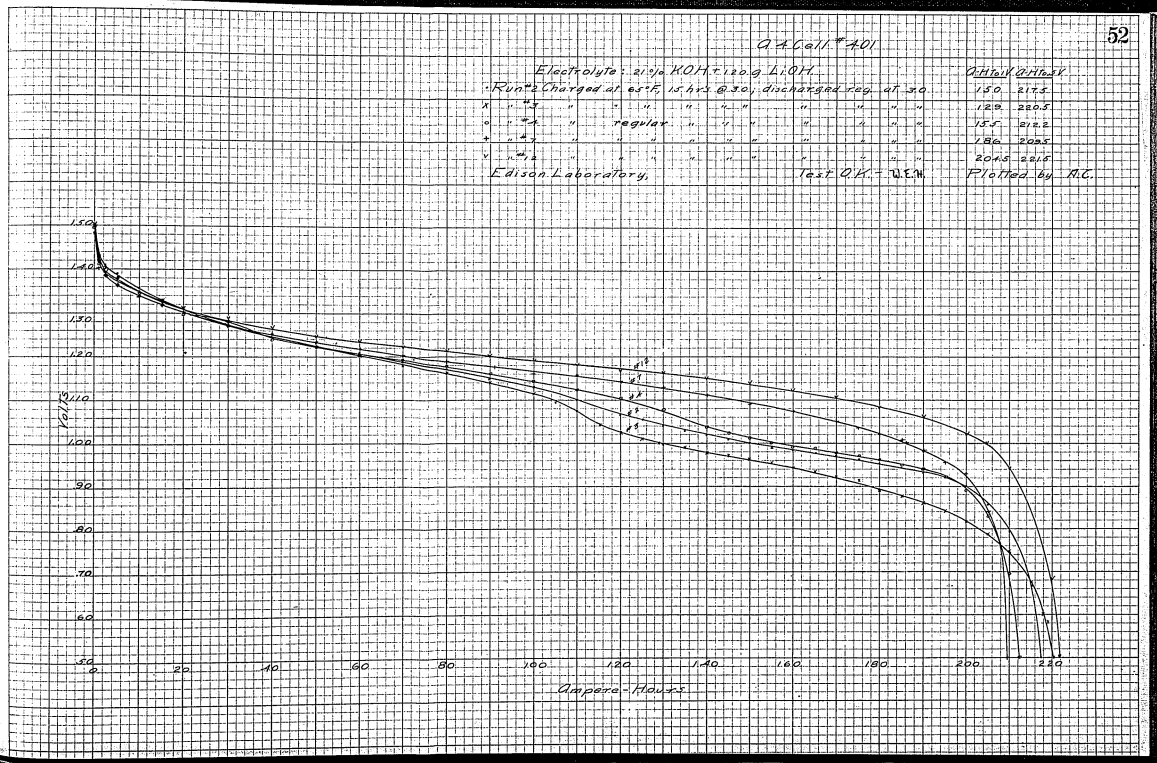

A-Cell # 598
Relation of Output to Input, in Ampere-Hours.
Charge and discharge rate: 30 amps. Discharges Terminated at 1.V.
Each point plotted is the average of two or three runs.
Curve A - Runs made with diminishing input
Curve B - " " " increasing "
Runs # 51-101, 2/7/09 to 5/18/09.
Edison Laboratory. Test O.K.-W.E.M. Plotted by R.C.
100% Eff.
90% Eff.
80% Eff.
A
B
Ampere-Hour Output
Ampere-Hour Input
0
20
40
60
80
100
120
140
160
180
200
220
0
40
80
120
160
200
240
280
320
360
400
440

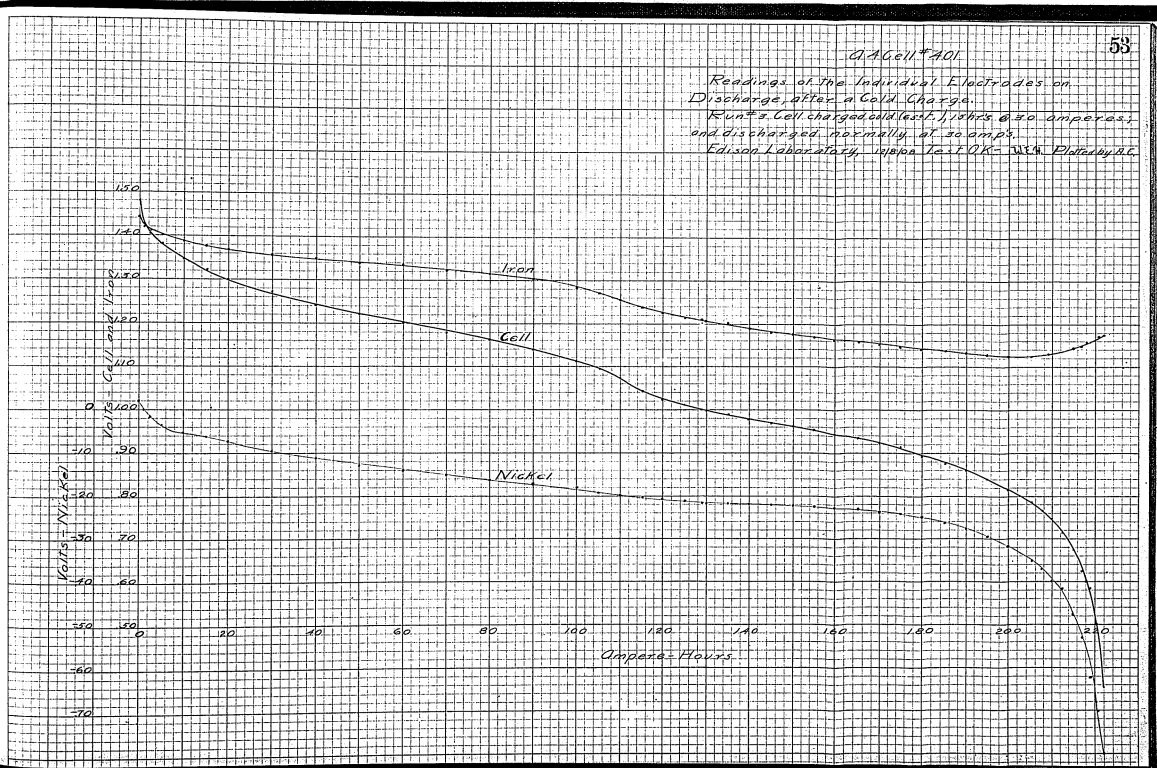

O-A Cell #598
A Normal-Rate Run Following a Period of Idleness,
Compared with Same Made Consecutively.
Cell charged 7 hours at 30 amperes and discharged
at 30 amperes.
Run #125, 4/5/09. After 38 hours of idleness
× " #135, 4/13/09. Made consecutively.
Edison Laboratory, Test O.K. J.E.W. Plotted by R.C.
Run #125
Run #135
P.D. in Volts
180
170
160
150
140
130
120
110
100
0
20
40
60
80
100
120
140
160
180
220
240
Ampere-Hours

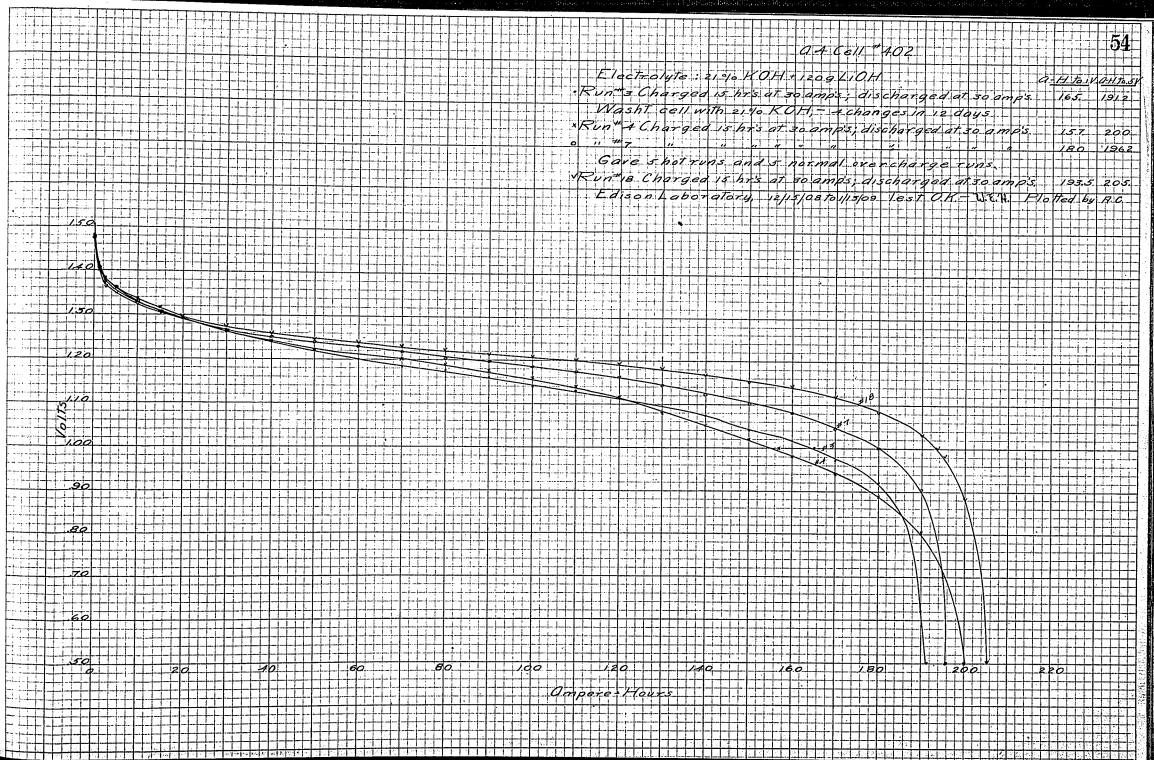

Cell #398
Normal Runs, Made at Different Periods in Cell's Life.
Run #10 1/4/09 Charged 7 hours at 30 amps; discharged at 30 amps.
x " 90 3/5/09 " " " " " " " " " 184
Run #10
Run #90
Run #10
Run #90
PD in Volts
180
170
160
150
140
130
120
110
100
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours

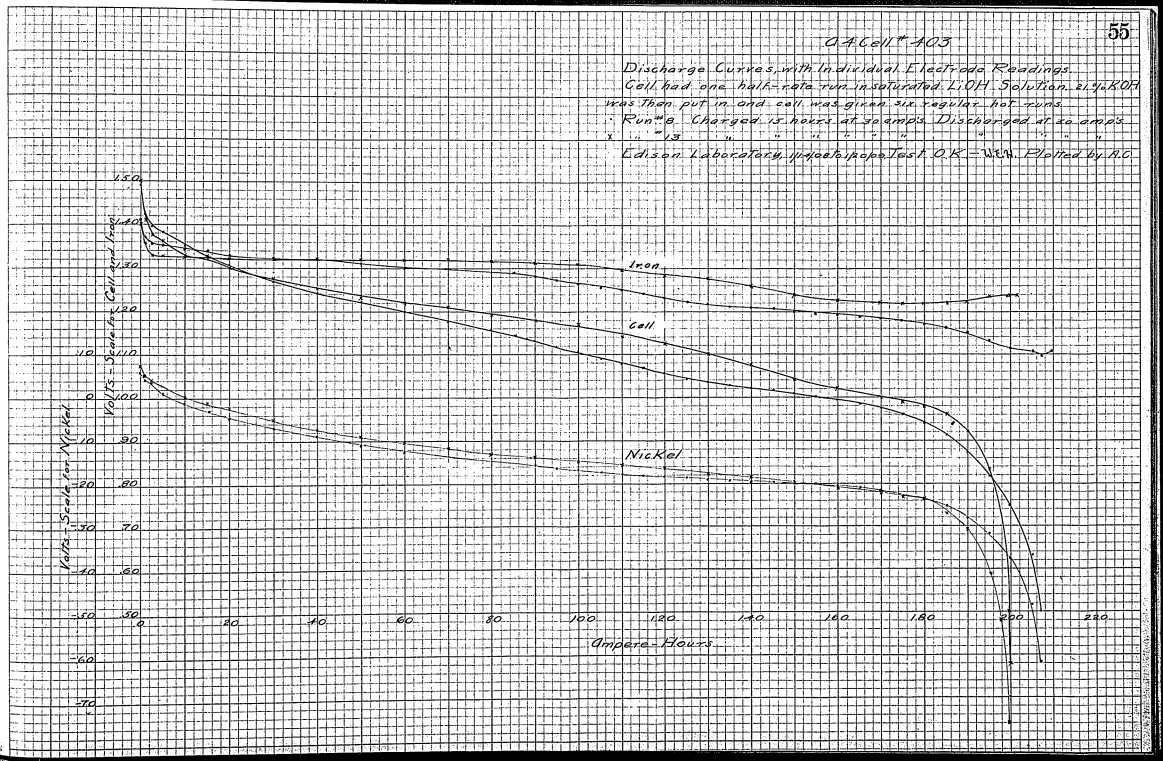

A-4 Cell #398
Life Curve, - Showing Output at Different Periods of Cells
Life.
Electrolyte: 21% KOH + 1% LiOH
Charge and discharge rate: 30 amperes
Black, solid line: Output to 1V on a 15 hour charge
" dotted " " " .5V " " " "
Red, Solid " " " 1V " 7-hour "
Edison Laboratory.
Test O.H. — U.E.N. Plotted by
Amperes-Hour Output
Number of Runs
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
0
40
80
120
160
200
240
280
320
360
400
440

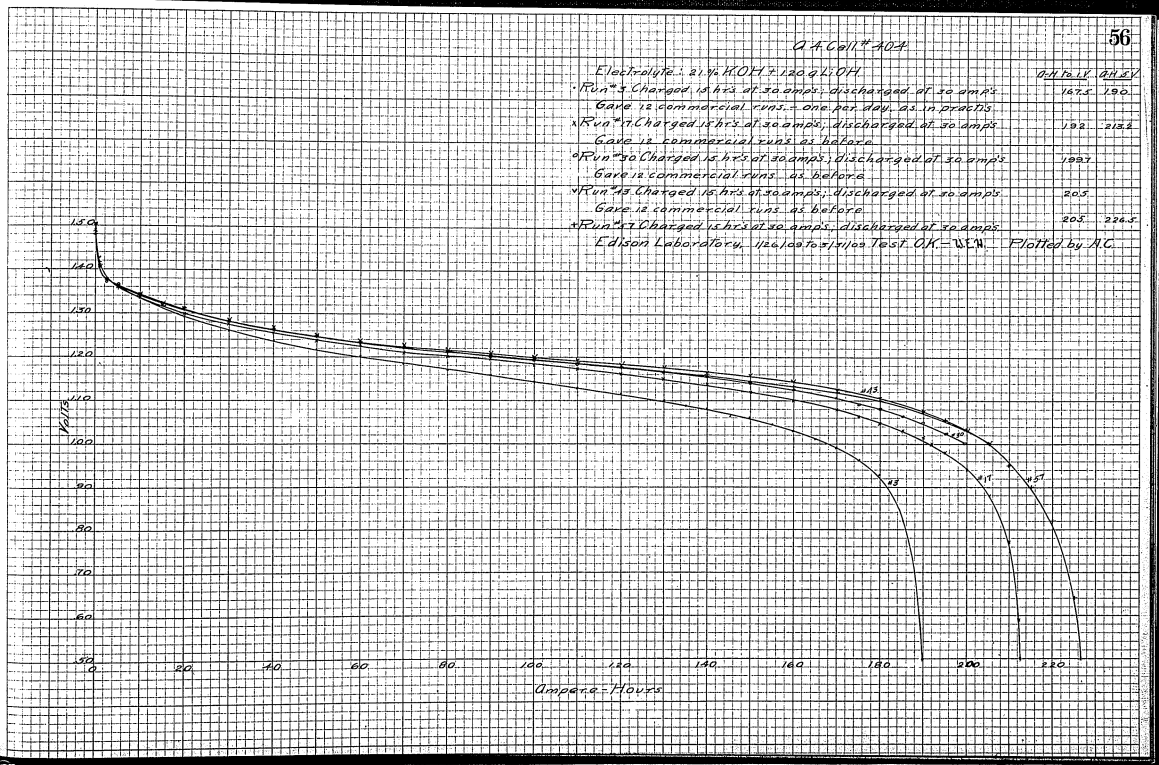

A.4 Cell #400.
Electrolyte: 21% KOH + 120 g LiOH.
Gave 2 runs, charging 17 hours at 15 amps. and discharging at 90 and 30 amps. Than 2 normal overcharge runs.
AHr. AHEW.
Run #5 Charged 15 hrs at 30 amperes, discharged at 30 amps. 180. 201.5
Gave 5 more normal overcharge runs.
x " #11 Charged 15 hrs at 30 amps., discharged " " " 202. 222.
Gave 30 hot runs at 130°F.
o " #65 Charged 15 hours at 30 amps. " " " " 181.2 204.5
Put in fresh 21% KOH.
v " #68 Charged 15 hours at 30 " " " " " " 182.5 196.
Volts
Ampere-Hours

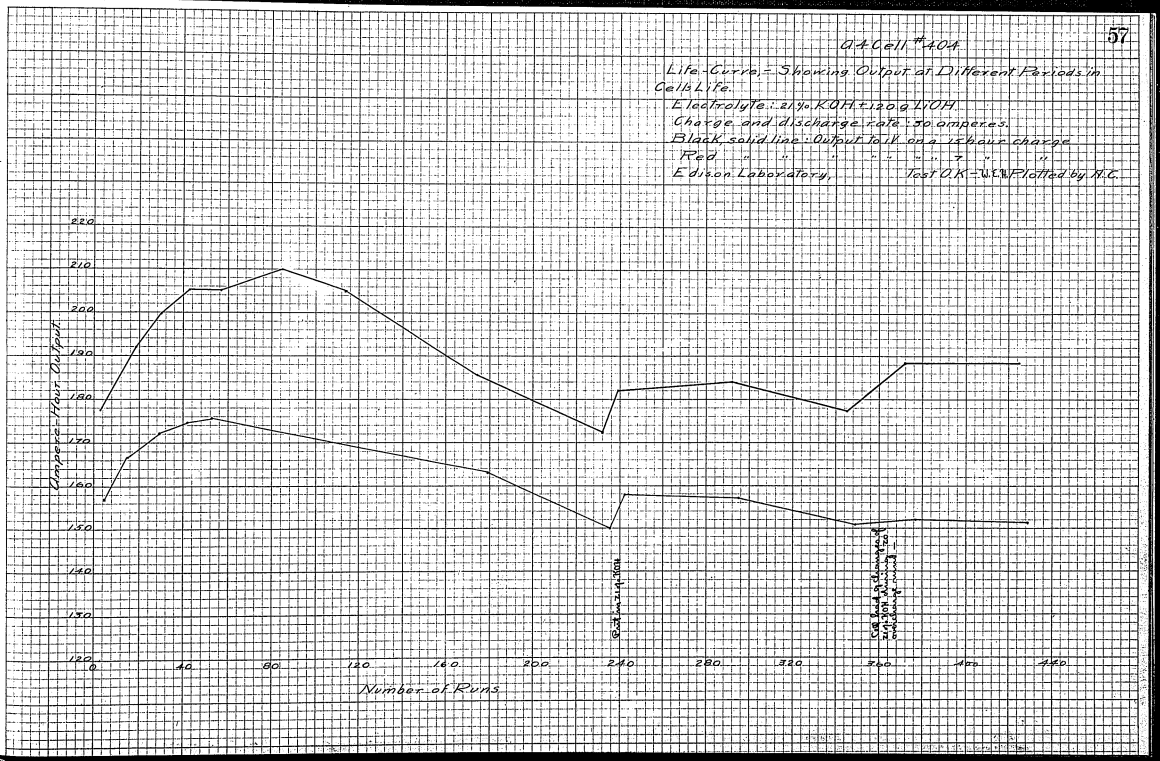

A 4 Cell #401
Electrolyte: 21% KOH + 120 g LiOH
Run #2 Charged at 65°F, 15 hrs @ 30, discharged reg. at 30 — 2 Hrs — 4 Hrs
Run #3 " " " " " " " " " " " 150. 217.5
X " #7 " " " " " " " " " " " 129. 220.5
O " #5 " regular " " " " " " " " 135. 212.2
+ " #1 " " " " " " " " " " " 180. 209.5
V " #12 " " " " " " " " " " " 204.5 221.5
Edison Laboratory, Test O.K. - D.E.N. Plotted by A.C.
Volts
150
140
130
120
110
100
90
80
70
60
50
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours


A.A Cell #401
Readings of the Individual Electrodes on
Discharge, after a Cold Charge.
Run #3. Cell charged cold last 1 1/2 hrs @ 30 amperes;
and discharged normally at 30 amps.
Edison Laboratory, 1/8/08 Test OK - W.H. Plotted by H.C.
Iron
Cell
Nickel
Volts - Cell and Iron
Volts - Nickel
Ampere-Hours
150
140
130
120
110
100
90
80
70
60
50
0
-10
-20
-30
-40
-50
-60
-70
0
20
40
60
80
100
120
140
160
180
200
220


0.4 Cell #402
Electrolyte: 21% KOH + 120g LiOH
Run #3 Charged 15 hrs at 30 amps; discharged at 30 amps. 165. 1912
Washt. cell with 21% KOH — 2 changes in 12 days.
Run #4 Charged 15 hrs at 30 amps; discharged at 30 amps. 157. 200.
" " 7 " " " " " " " " " " 120 1962
Gave 3 short runs and 3 normal overcharge runs.
Run #8 Charged 15 hrs at 30 amps; discharged at 30 amps. 193.5 205.
Edison Laboratory, 12/15/08 to 11/3/09 Test O.K. — W.C.H. Plotted by R.C.
Volts
Ampere-Hours
#8
#4
#3
#7


O A Cell # A03
Discharge Curves with Individual Electrode Readings.
Cell had one half-rate run in saturated LiOH Solution, 21% KOH
was then put in and cell was given six regular hot runs.
Run #8 Charged 15 hours at 30 amps. Discharged at 20 amps.
" #13 " " " " " " " " "
Edison Laboratory, Hackensack, Test O.K. - W.H. Plotted by H.C.
Iron
Cell
Nickel
Volts - Scale for Nickel
Volts - Scale for Cell and Iron
Ampere-Hours
150
140
130
120
110
100
90
80
70
60
50
0
10
20
30
40
-10
-20
-30
-40
-50
-60
-70
0
20
40
60
80
100
120
140
160
180
200
220


A.A. Cell # 404
Electrolyte: 21% KOH + 120 g/l OH
0-H to V. AH S.V.
Run # 3 Charged 15 hrs at 30 amps; discharged at 30 amps 167.5 190.
Gave 12 commercial runs - one per day, as in prec'ns
Run # 17 Charged 15 hrs at 30 amps; discharged at 30 amps 192 213.2
Gave 12 commercial runs as before
Run # 30 Charged 15 hrs at 30 amps; discharged at 30 amps 199.7
Gave 12 commercial runs as before
Run # 43 Charged 15 hrs at 30 amps; discharged at 30 amps 205
Gave 12 commercial runs as before
Run # 57 Charged 15 hrs at 30 amps; discharged at 30 amps 205 226.5
Edison Laboratory 11/26/09 to 3/31/09 Test OK - W.C.H. Plotted by A.C.
Volts
Ampere-Hours
150
140
130
120
110
100
90
80
70
60
50
0
20
40
60
80
100
120
140
160
180
200
220
#13
#17
#30
#43
#57


Ni-Cd Cell #404
Life-Curve,- Showing Output at Different Periods in Cell's Life.
Electrolyte: 21% KOH + 120 g LiOH
Charge and discharge rate: 30 amperes.
Black solid line: Output to 1.1 on a 15 hour charge
Red " " " " " " 7 " "
Edison Laboratory, Test O.K. W.C.W. Plotted by H.C.
Ampere-Hour Output
220
210
200
190
180
170
160
150
140
130
120
0
40
80
120
160
200
240
280
320
360
400
440
Number of Runs

D.A. Cells #466 and #467, (15.5 Pound Cells)

Run #51. Charged 7 hours at 30 amps. Discharged at 30 amperes.

	#466	#467		#466	#467
Ampere-Hour Input	210.0	210.0	Ampere-Hour Efficiency	83.5	83.8
" " Output	179.5	176.0			
Average P.D. of Charge	1.731	1.721	Volt Efficiency	69.6	70.3
" " " Discharge	1.203	1.210			
Watt-Hour Input	362.5	361.3	Watt-Hour Efficiency	58.4	59.0
" " Output	216.0	213.1			

Watt-Hour Output per Pound #466 – 16.0; #467 – 15.78.

Edison Laboratory. 4/8/03 Test O.K. W.E.H. Plotted by H.C.

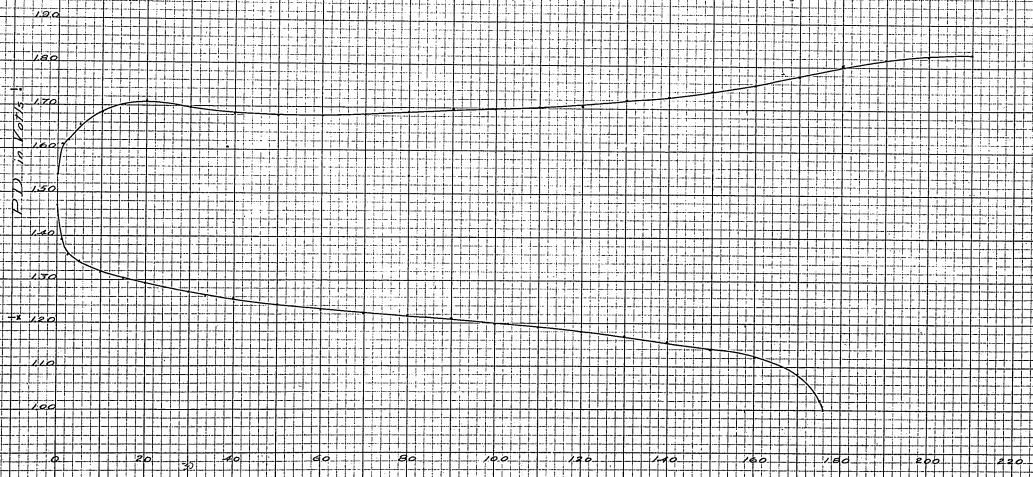
O.A. Cell # 468 (13.5 Pound Cell)

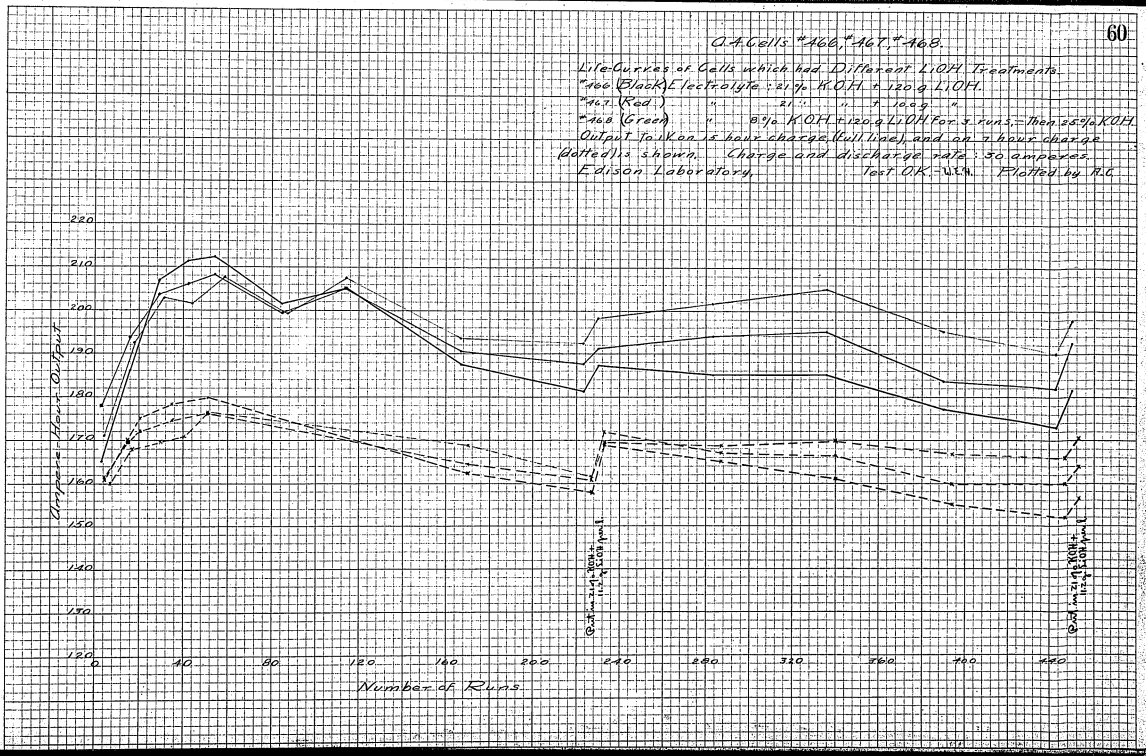
Run # 51. : Charged 7 hours at 30 amperes Discharged at 30 amp's.

Ampere-Hour Input	210.0	Ampere-Hour Efficiency	83.8%
" " Output	176.0		
Average P.D. of Charge	1.734	Volt Efficiency	69.8%
" " " Discharge	1.210		
Watt-Hour Input	364.1	Watt-Hour Efficiency	58.4%
" " Output	213.0		

Watt-Hour Output per Pound — 15.77

Edison Laboratory 4/8/09 Test O.K. — W.C.H. Plotted by R.C.




O.A. Cells #166, #167, #168.
Life-Curves of Cells which had Different LiOH Treatments.
#166 (Black) Electrolyte: 21% KOH + 120 g LiOH.
#167 (Red) " " 21 " " + 10.0 g "
#168 (Green) " 8% KOH + 120 g LiOH for 3 runs. Then 25% KOH
Output to 1.100 v 5 hour charge (full line) and on 7 hour charge (dotted) is shown. Charge and discharge rate: 30 amperes.
Edison Laboratory. Test O.K. - U.E.A. Plotted by R.C.
Ampere-Hours Output
220
210
200
190
180
170
160
150
140
130
120
0
40
80
120
160
200
240
280
320
360
400
440
Number of Runs

E. S. B. – Type A
Vol. II

These are first nickel-boosted cells made.

O.A. Cells #478, #479, #480.

Life-Curves of Cells which have Different Amounts of LiOH in the 21% - KOH Electrolyte.

#478 (Black), 90 g LiOH. #479 (Red) 105 g LiOH. #480 (Green), 120 g LiOH

Full line: Output to 1 V at 30 amps, on a 5 hour charge at 30 amps.

Dotted line: " " .5 V " 40 " " " 7 " " " 30 amps.

Edison Laboratory — Test O.K.-W.C.W. Plotted by A.C.

A-A Cells #A18, #A19, #A80.

Discharge 15 at to 0 amps. after a 15 hr. charge at 30 amperes — A-H to 1 volt — A-H to 1 volt

Cell #A18, (Black), Electrolyte 21% KOH + 30 g. LiOH — 178.5 — 190

" #A19, (Red), " " " + 105 g. " — 179.5 — 191

" #A80, (Green), " " " + 120 g. " — 178.5 — 194.5

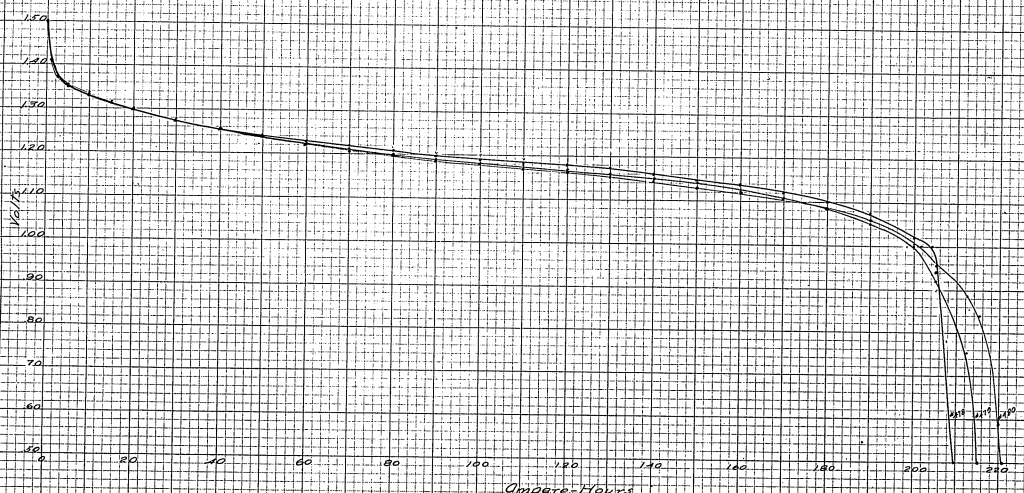
Edison Laboratory 3/15/09. Test OK - W.E.H. Plotted by A.C.

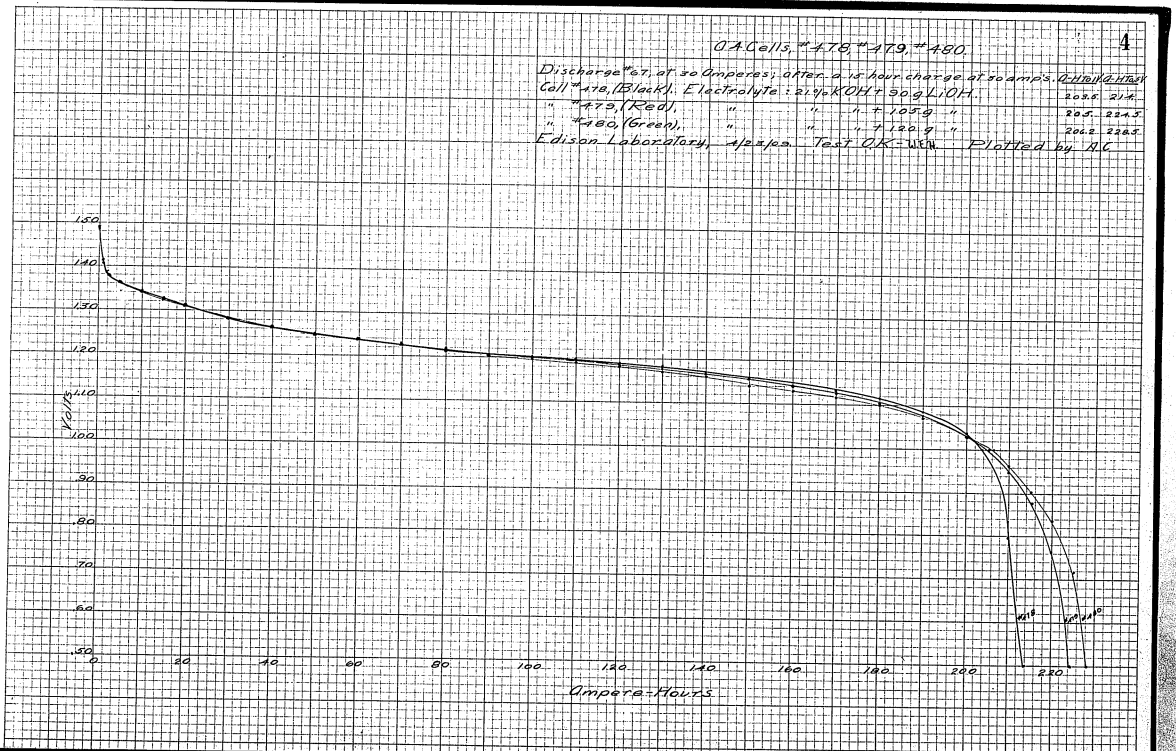
0.4 Cells #478, #479 #480.

Discharge #27, at 30 amperes, after a 12-hour charge at 30 amps

	Ampere-Hours	Ampere-Hours
Cell #478, (Black). Electrolyte: 21% KOH + 30 g. LiOH	204.9	209.5
" #479, (Red). " " " " 105 " "	200.	215.0
" #480, (Green). " " " " 120 " "	201.5	230.5

Edison Laboratory 3/24/09 Test OK — W.C.H. Plotted by A.C.



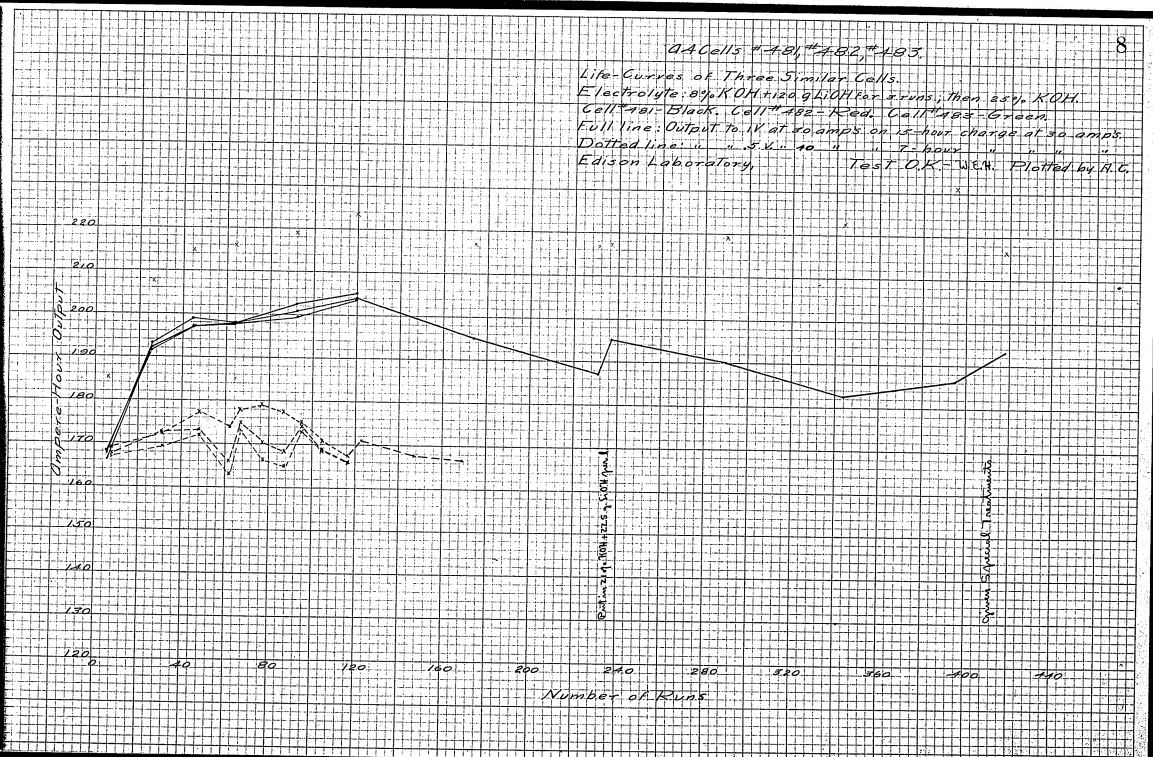

O.A. Cells, #478, #479, #480.
Discharge test, at 30 Amperes; after a 15 hour charge at 30 amps.
Cell #478, (Black). Electrolyte: 21% KOH + 90 g LiOH.
" #479, (Red), " " " + 105 g "
" #480, (Green), " " " + 120 g "
Edison Laboratory, 4/2/1930. Test O.K.-W.H.
Plotted by A.C.
Volts
Ampere-Hours
150
140
130
120
110
100
90
80
70
60
50
0
20
40
60
80
100
120
140
160
180
200
220

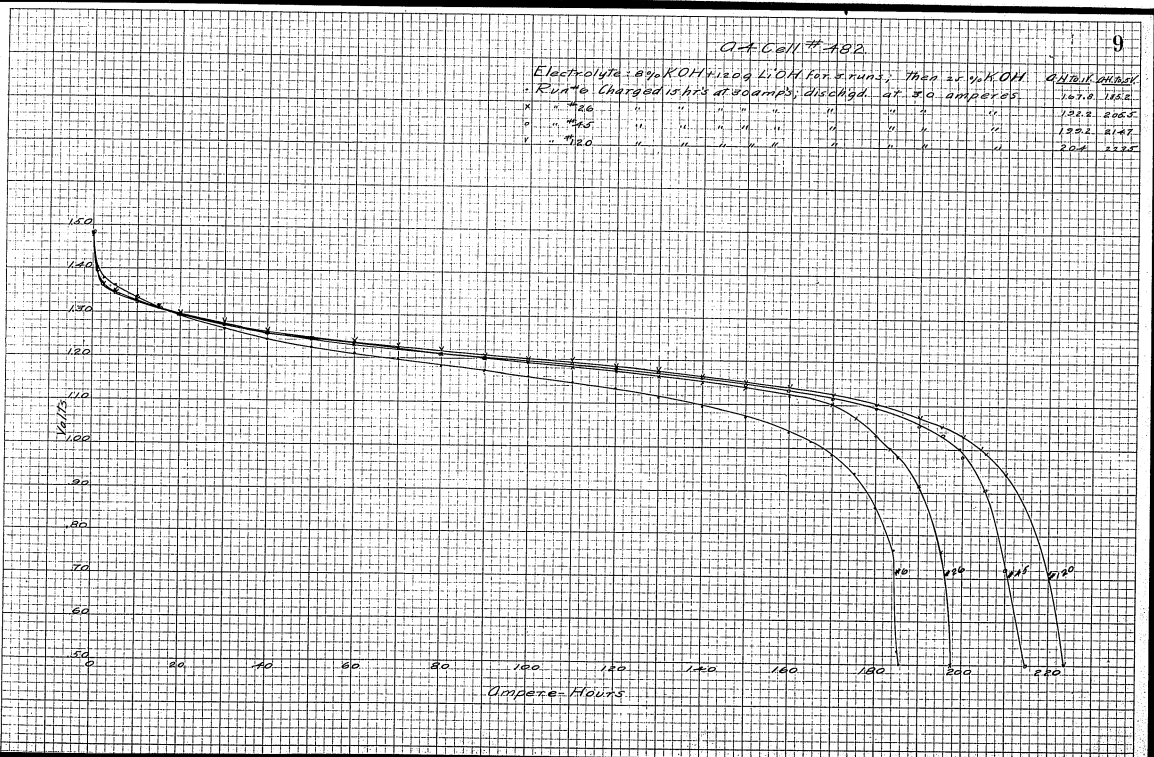
O.A Cells, #478, #479, #480.

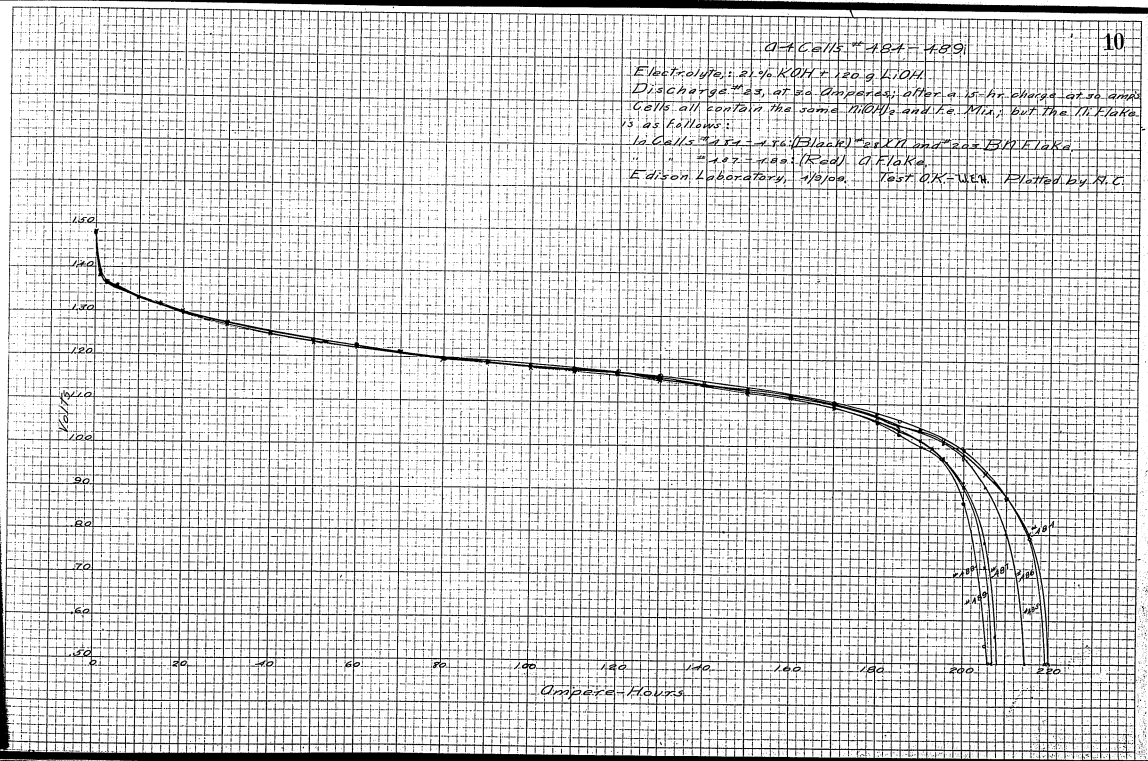
Discharge #122, at 30 Amperes; after a 15 hour charge at 30 amps (Hall 4 hrs)

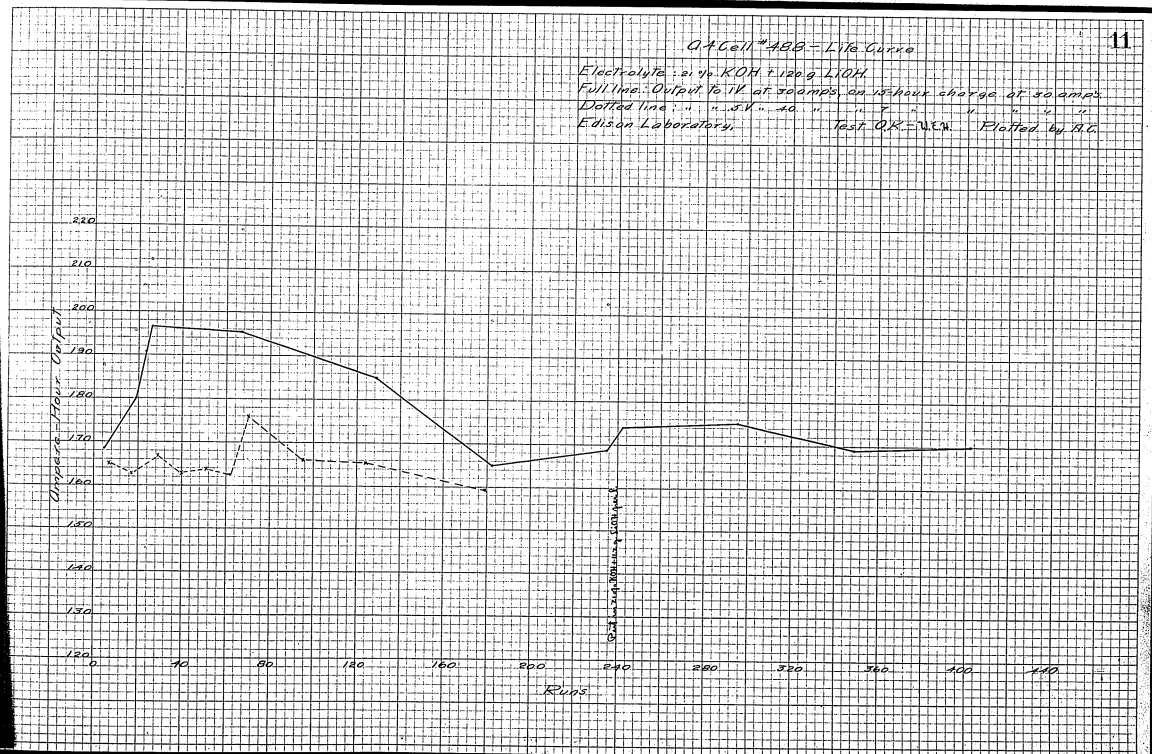
Cell #478, (Black), Electrolyte: 41.94 KOH + 90 g LiOH.							202.5	2125
" #479, (Red),	"	"	"	+ 105	"	"	200.	2220
" #480, (Green),	"	"	"	+ 120	"	"	200.	2322

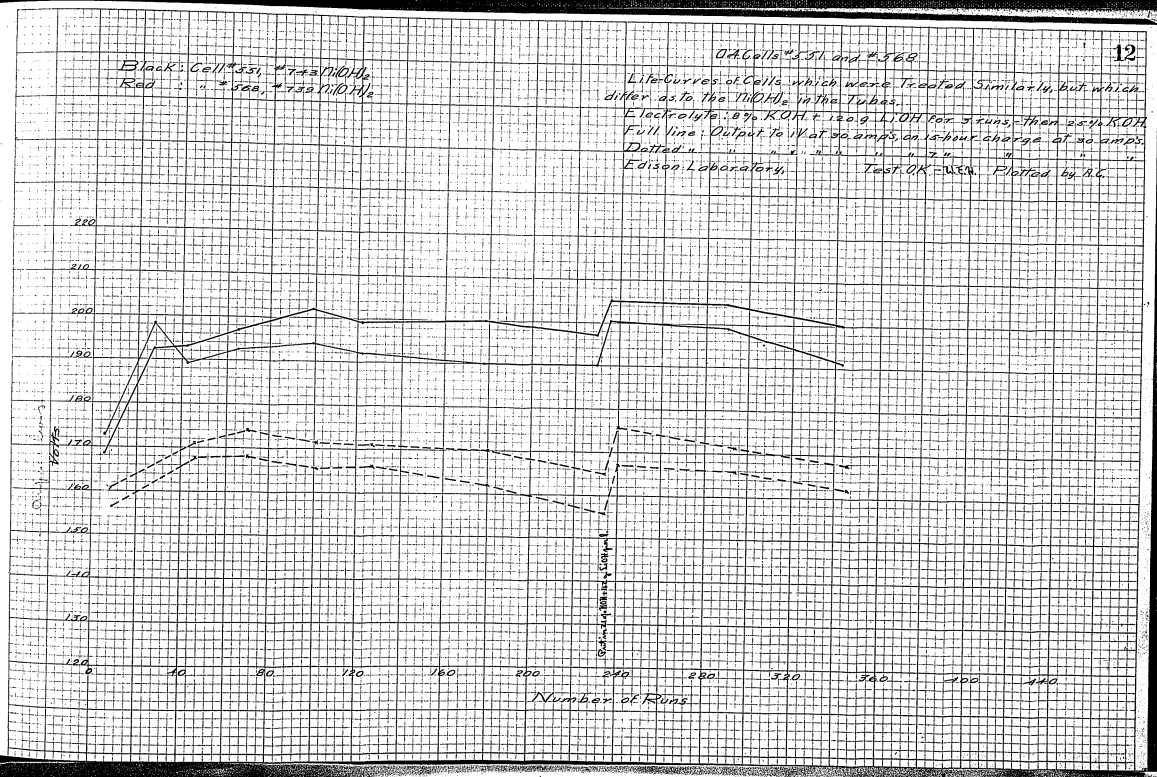
Edison Laboratory, 6/2/09. Test O.K. - [illegible] Plotted by N.C.

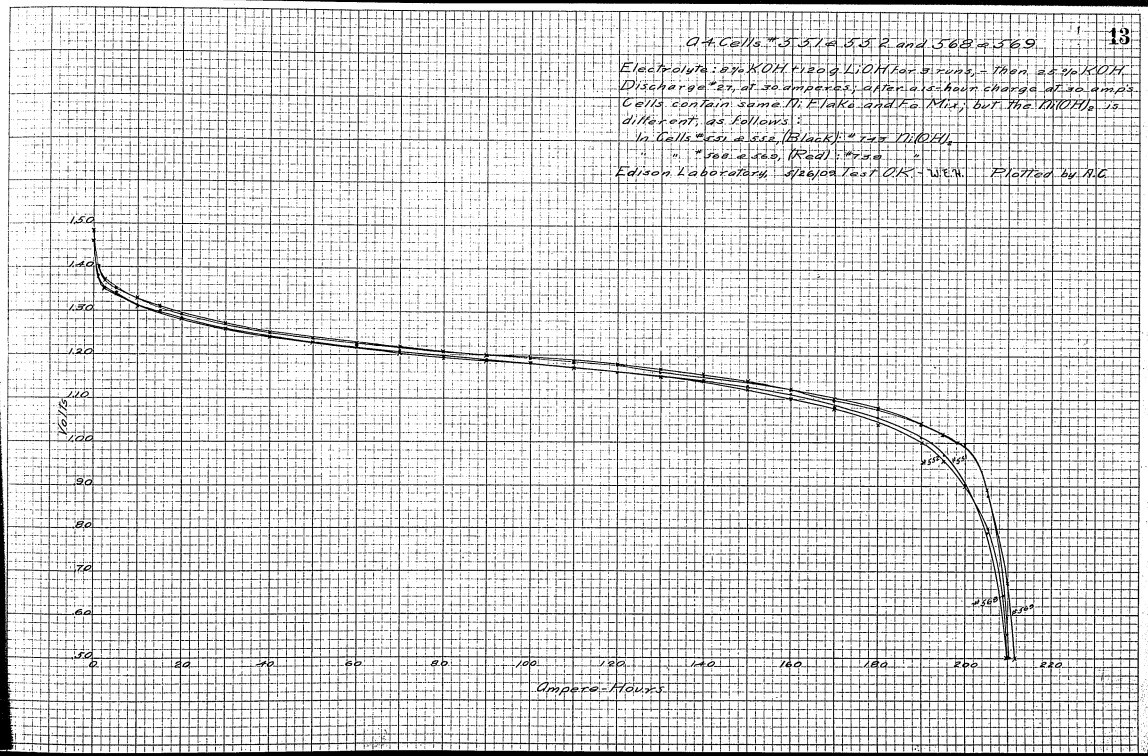

A-4 Cells #481, #482, #483.
Life-Curves of Three Similar Cells.
Electrolyte: 8% KOH + 120 g LiOH for 3 runs; then 8% KOH.
Cell #481 - Black. Cell #482 - Red. Cell #483 - Green.
Full line: Output to 1V at 30 amps on 15-hour charge at 30 amps.
Dotted line: " " 5V " 10 " " " 7-hour " " " "
Edison Laboratory. Test O.K. - W.E.H. Plotted by R.G.
Ampere Hour Output
220
210
200
190
180
170
160
150
140
130
120
0
40
80
120
160
200
240
280
320
360
400
440
Number of Runs
Cell #481 on 2% LiOH + 225 g KOH (run 1)
Cell #481 Special Treatment

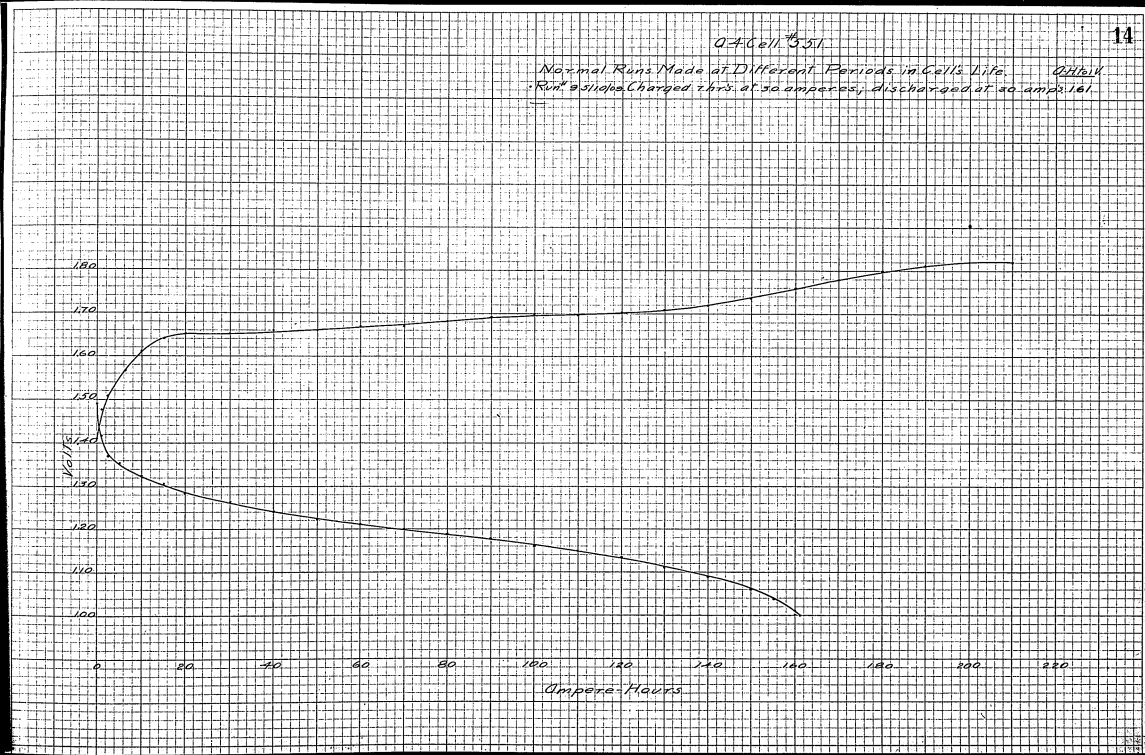

A-1 Cell #182.
Electrolyte: 8% KOH + 120 g LiOH for 3 runs; then 25% KOH
Run #6 charged 15 hrs at 30 amps; dischgd. at 50 amperes.
X " #26 " " " " " " " " " 147.0 185.2
O " #45 " " " " " " " " " 192.2 206.5
Y " #20 " " " " " " " " " 204 224.5
Volts
Ampere-Hours

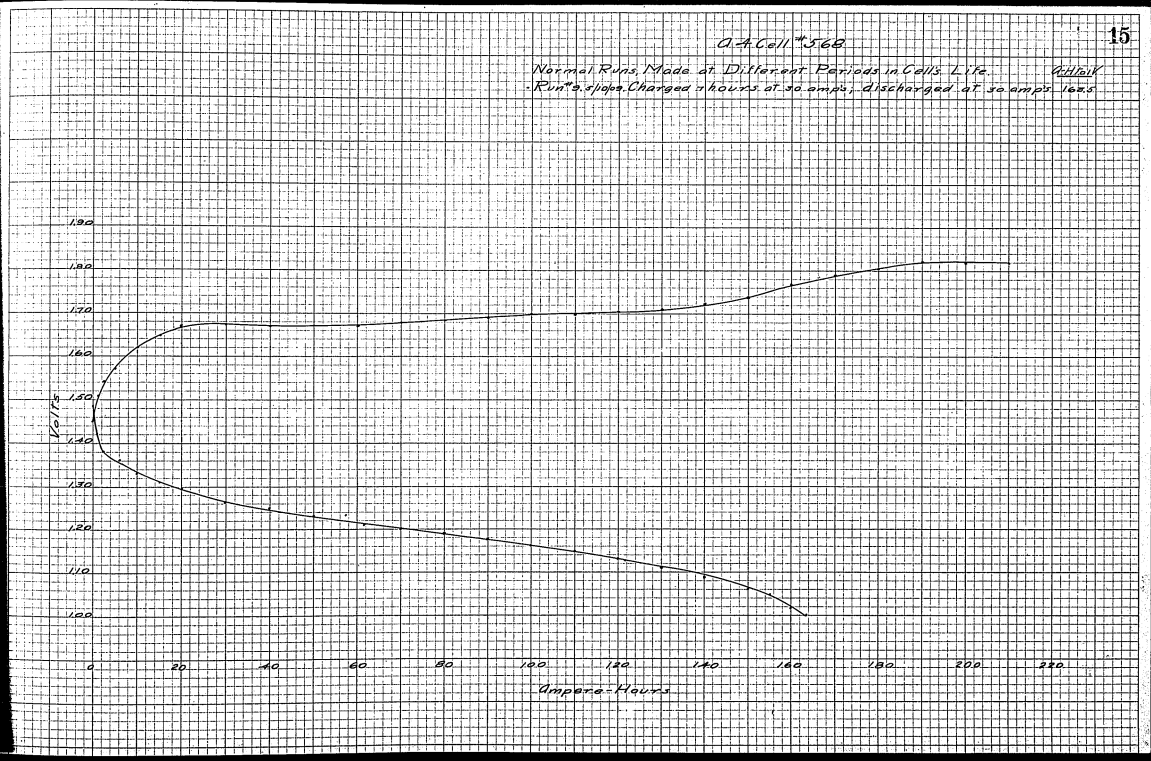

0-4 Cells #184 - 189.
Electrolyte: 21% KOH + 120 g LiOH.
Discharge #23, at 30 Amperes; after a 15 hr. charge at 30 amp.
Cells all contain the same $Mn(OH)_2$ and Fe. Mix.; but the Ni Flake
is as follows:
10 Cells #184 - 186 (Black) #2 is 1% and #2 is 3% Ni Flake.
" #187 - 189: (Red) 1% Flake.
Edison Laboratory, 1/9/08. Test OK - W.E.H. Plotted by H.C.
Volts
Ampere-Hours
150
140
130
120
110
100
90
80
70
60
50
0
20
40
60
80
100
120
140
160
180
200
220


Q-4 Cell #486 – Life Curve
Electrolyte: 21% KOH + 120 g LiOH
Full line: Output to 1V at 30 amps, on 12-hour charge at 30 amps
Dotted line: " " 5V " 40 " " " 7 " " " " "
Edison Laboratory. Test O.K. – W.E.N. Plotted by H.C.
Ampere-Hour Output
220
210
200
190
180
170
160
150
140
130
120
0
40
80
120
160
200
240
280
320
360
400
440
Runs


Black: Cell #351, #743 $Ni(OH)_2$
Red : " #368, #730 $Ni(OH)_2$
O.A. Cells #351 and #368
Life Curves of Cells which were Treated Similarly, but which differ as to the $Ni(OH)_2$ in the Tubes.
Electrolyte: 8% KOH + 120 g LiOH for 3 runs, Then 25% KOH
Full line: Output to 1 Volt at 30 amps, on 14-hour charge at 30 amps
Dotted " " " " " " " " 7 " " " "
Edison Laboratory. Test OK - WEN Plotted by R.C.
Volts
220
210
200
190
180
170
160
150
140
130
120
0
40
80
120
160
200
240
280
320
360
400
440
Number of Runs
Cell changed to 30% KOH + 5% LiOH


04 Cells #351 & 352 and 368 & 369.
Electrolyte: 8% KOH + 120 g. LiOH for 3 runs, - then 2.5% KOH.
Discharge #27, at 30 amperes, after 41-hour charge at 30 amps.
Cells contain same Ni. Flake and Fe Mix, but the Ni(OH)2 is different, as follows:
In Cells #351 & 352, (Black) #143 Ni(OH)2
" " #368 & 369, (Red) #133 "
Edison Laboratory, 5/26/09. Test OK - W.E.M. Plotted by A.C.
Volts
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours
#352
#351
#368
#369


O.A. Cell #351.
Normal Runs Made at Different Periods in Cells Life.
Run #9 Slides Charged 1 hrs. at 30 amperes, discharged at 40 amps. 161.
180
170
160
150
140
130
120
110
100
Volts
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours


O.A. Cell #568
Normal Runs, Made at Different Periods in Cells Life.
Run #3 always Charged 7 hours at 30 amps, discharged at 30 amps 16 a.s
Volts
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours

Black: Cell #643, "A" Ni. Flake
Red: " #646, "B" Ni. Flake

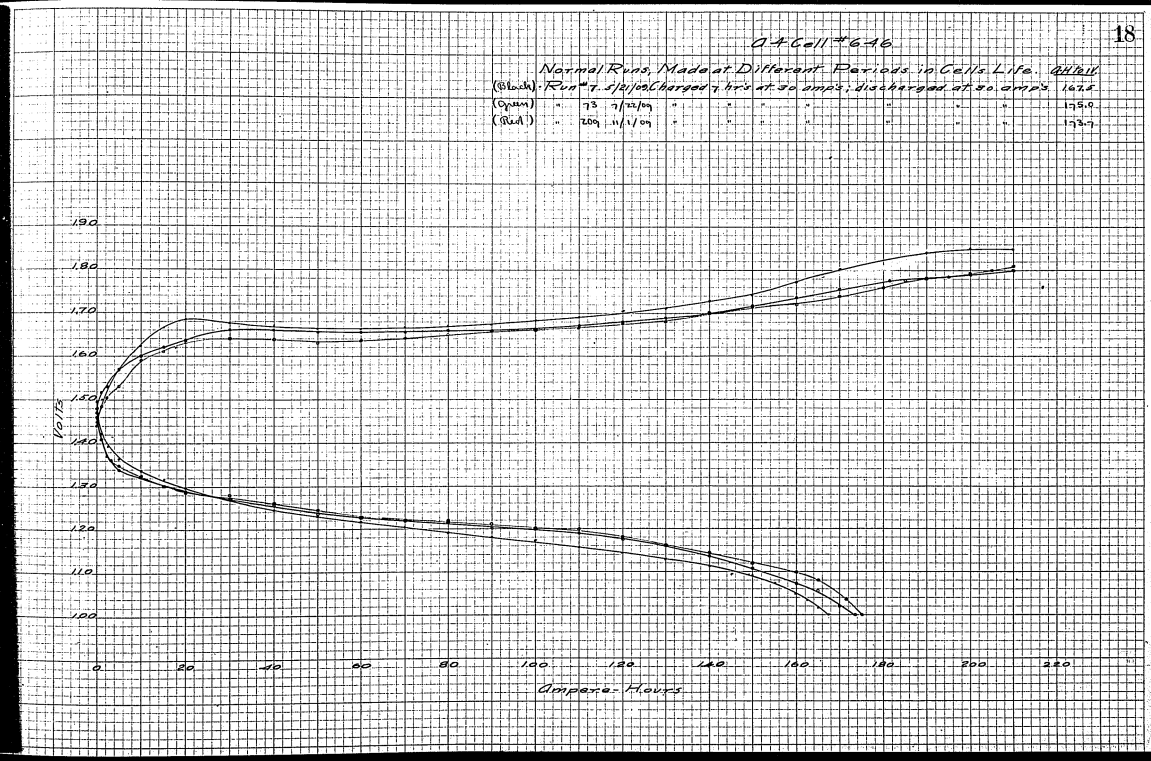
A & Cells #643 and #646

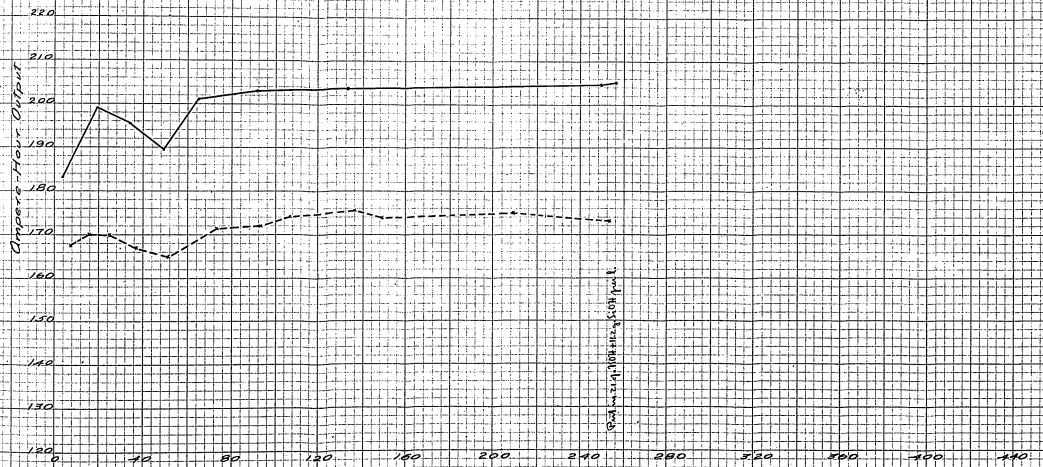
Life-Curves of Cells which were Treated Similarly, but which differ as to the Ni. Flake Used.
Electrolyte: 21% KOH + 100 g LiOH; $Ni(OH)_2$: #841
Full line: Output To 1.4 at 50 amps, on 15-hr. charge at 50 amps.
Dotted " " " " " " " 7-hr " " " "
Edison Laboratory, Test. O.K. W.E.H. Plotted by R.C.

A-Cell #643

Normal Runs, Made at Different Periods in Cells Life.

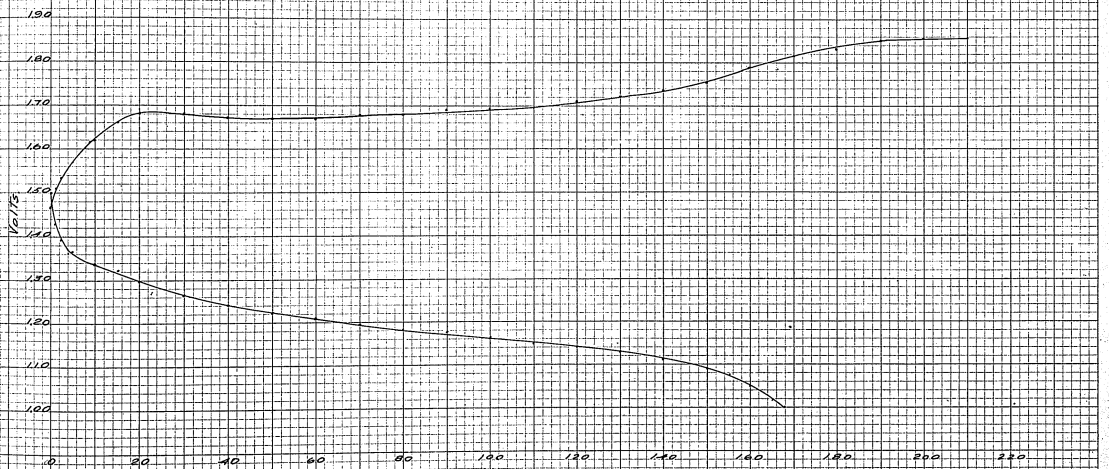
| | | |

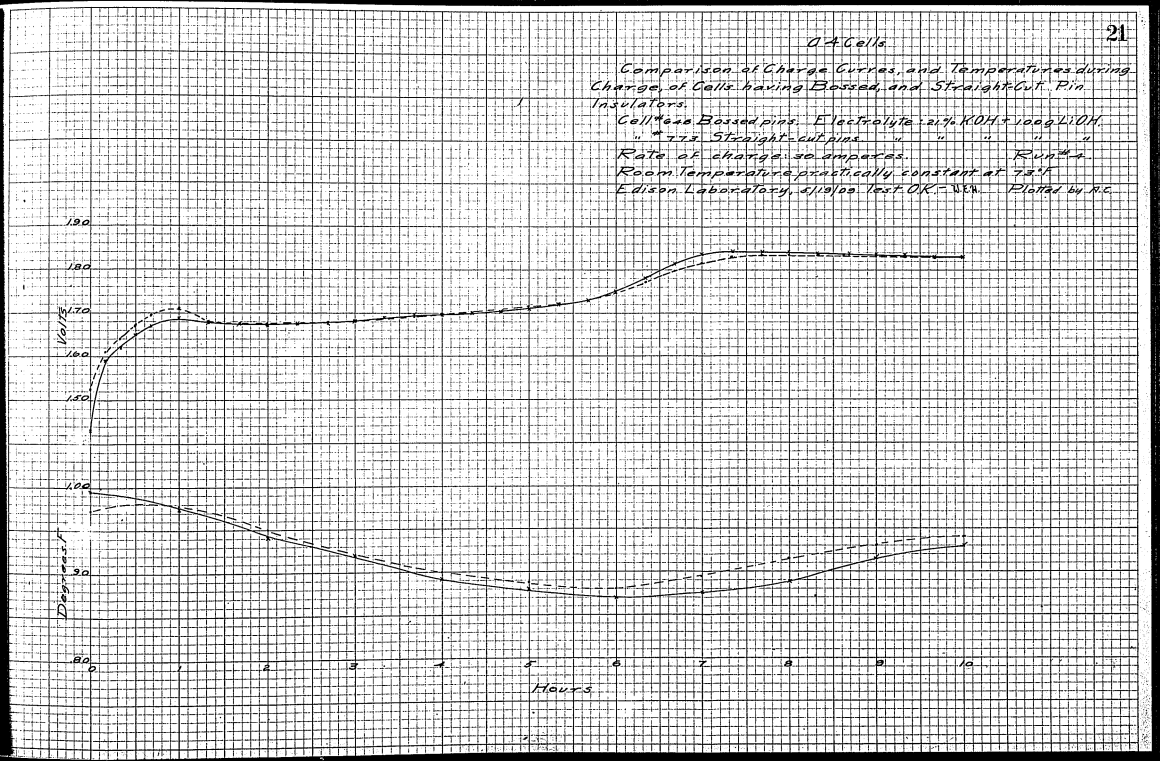

A4 Cell #646
Normal Runs, Made at Different Periods in Cells Life. All Cell
(Black). Run #7. 5/2/09. Charged 7 hrs at 30 amps; discharged at 30 amps. 164.4
(Green) " 73 7/22/09 " " " " " " " 175.9
(Red) " 209 11/1/09 " " " " " " " 173.7
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
Volts
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours


Q A Cell # 7.7.5. - Life Curve
Cell Contains Straight-Cut Pin-Insulators.
Electrolyte: 21% KOH + 100 g LiOH; Ni(OH)2: #842 & #843; Flake Cd.
Full line Output to 1.1 V. at 30 amps, on 1½ hour charge at 20 amps.
Dotted " " " " " " 7-hour " " " "
Edison Laboratory, Test OK - W.H. Plotted by A.E.
Ampere-Hour Output
220
210
200
190
180
170
160
150
140
130
120
0
40
80
120
160
200
240
280
320
360
400
440
Number of Runs
Cell Contains 21% KOH + 100 g LiOH

04 Cell #TT5

Normal Runs, Made at Different Periods in Cells Life 8/11/011.
Run #7 5/21/00 Charged 7 hrs. at 50 amps; discharged at 50 amps 16.75.

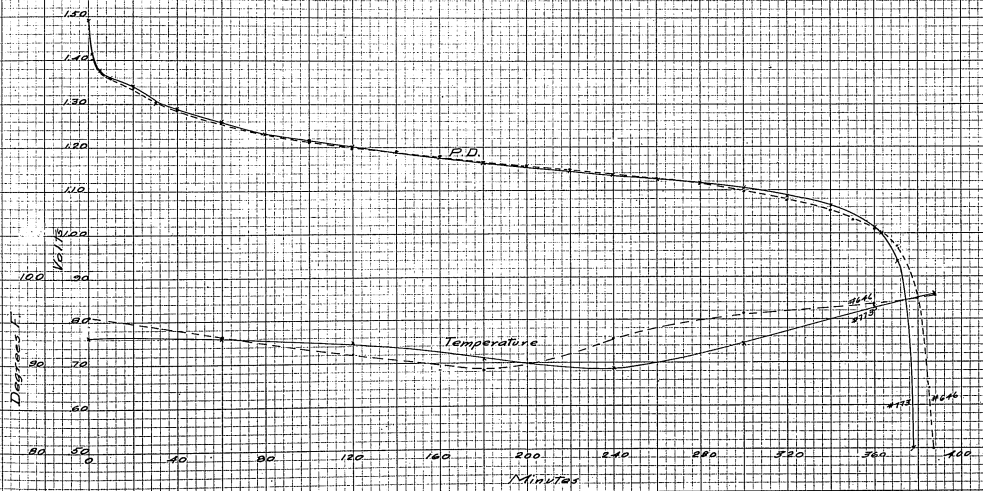



A-4 Cells.
Comparison of Charge Curves, and Temperatures during Charge, of Cells having Bossed, and Straight-Cut, Pin Insulators.
Cell #648 Bossed pins. Electrolyte: 21% KOH + 100g LiOH.
" #775 Straight-cut pins " " " " "
Rate of charge: 30 amperes. Run #4.
Room Temperature practically constant at 75°F.
Edison Laboratory, 5/19/09 Test OK. - U.E.A. Plotted by R.C.
Volts
Degrees F
Hours
1.90
1.80
1.70
1.60
1.50
1.00
90
80
0
1
2
3
4
5
6
7
8
9
10

A.A. Cells

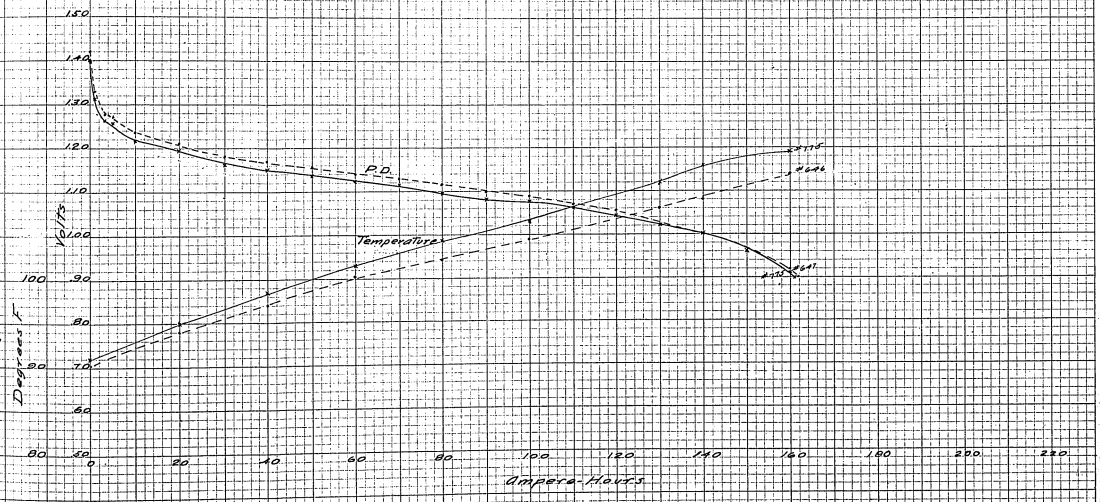
Comparison of Discharge Curves, and Temperature during Discharge, of Cells having Bossed and Straight-cut Pin Insulators.

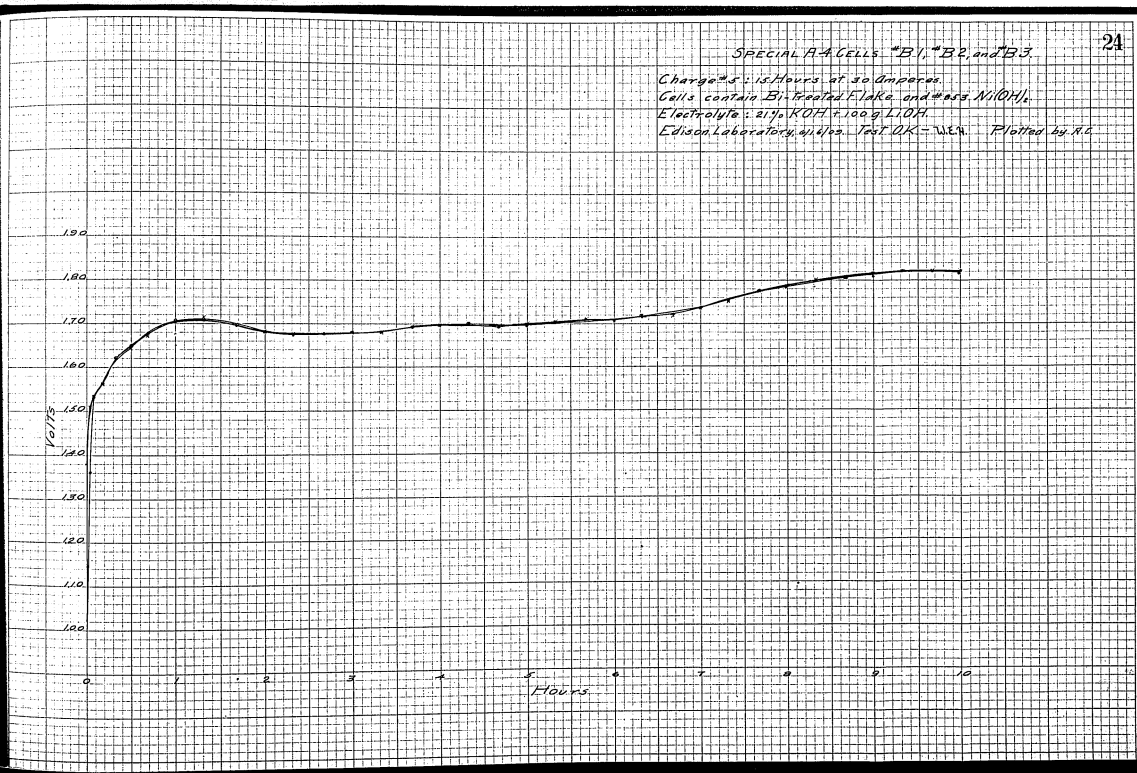
Cell #66 Bossed pins. Electrolyte: 21% KOH + 120 g LiOH.
" #73 Straight-cut pins " " " "
Rate of discharge: 30 amperes Run #4
Room temperature practically constant at 73°F.
Edison Laboratory, 5/21/02. Test O.K. — U.E.N. Plotted by H.C.

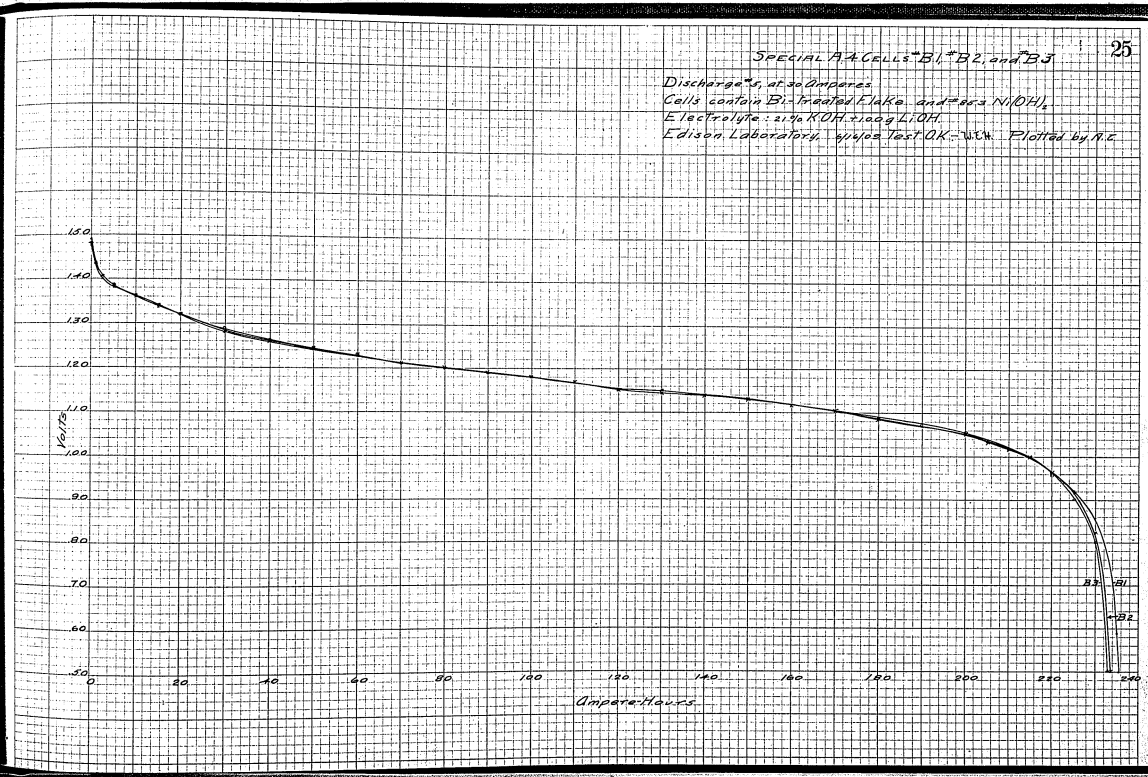


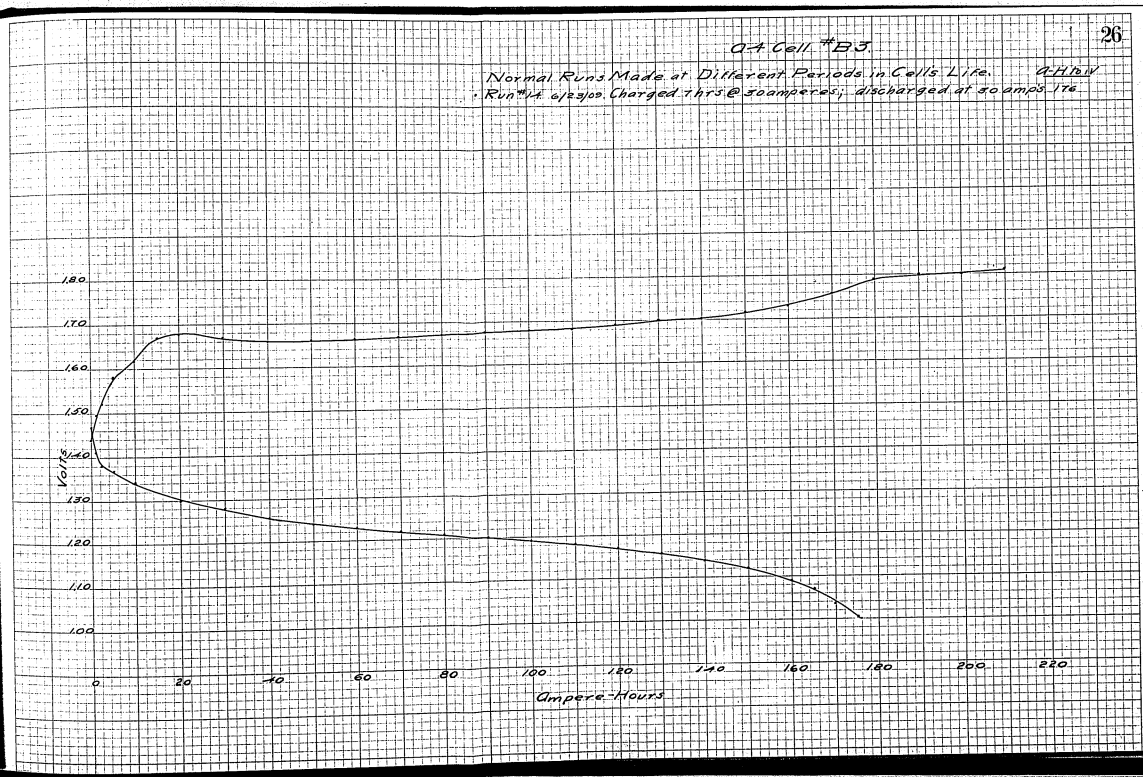
A-4 Cells

Temperature and Volt Curves on a High Rate Discharge.
Cell #416. Boxed pin-insulators
" #415. Straight-cut pin "
Electrolyte: 21% KOH + 100 g LiOH
Discharged at 80 amps after this charge at 30 amps
Room temperature constant: 72°F. Run #13.
Edison Laboratory, 3/26/00 Test O.K. — W.H. Plotted by A.F.




SPECIAL A-4 CELLS #B1, #B2, and #B3.
Charge #5: 15 Hours at 30 Amperes.
Cells contain Bi-Treated Flake and #253 Ni(OH)2.
Electrolyte: 21% KOH + 100 g LiOH.
Edison Laboratory, 4/1/20. Test O.K. – W.E.M. Plotted by H.C.
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
Volts
0
1
2
3
4
5
6
7
8
9
10
Hours

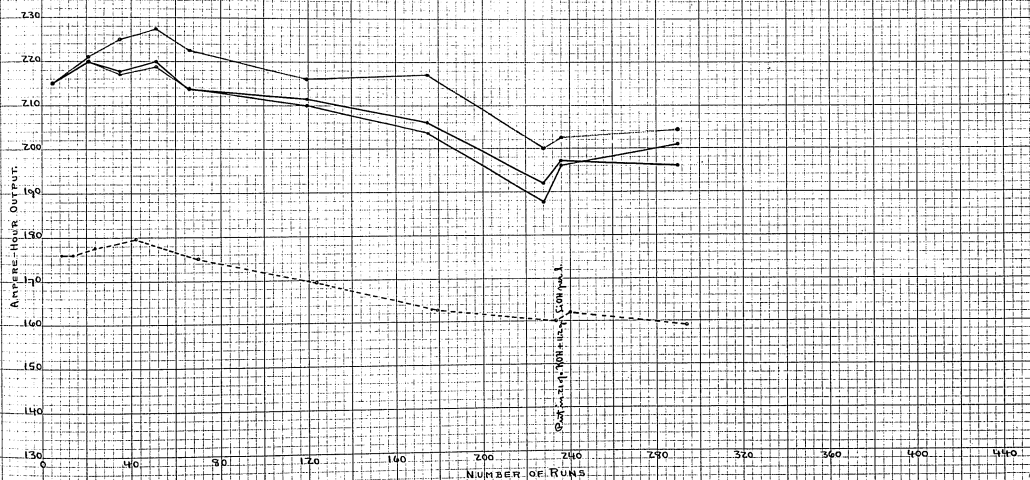

SPECIAL A.4 CELLS "B1," "B2," and "B3"
Discharges, at 30 Amperes
Cells contain Bi-Treated Flake and 2.5% Ni(OH)2
Electrolyte: 21% KOH + 100g LiOH
Edison Laboratory, 5/14/05 Test OK - W.M. Plotted by A.C.
Volts
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
0
20
40
60
80
100
120
140
160
180
200
220
240
Ampere-Hours
B3
B1
B2


0-4 Cell #B3.
Normal Runs Made at Different Periods in Cells Life.
0-4 Ib.
Run #4 6/23/09. Charged 7 hrs @ 30 amperes; discharged at 30 amps 176
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
Volts
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours

A4 CELLS #B1 – B3, – LIFE CURVE.

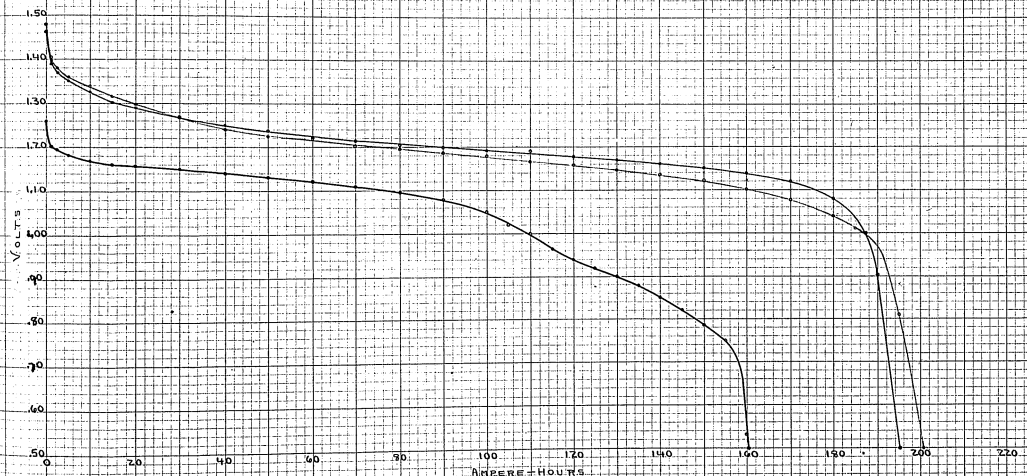
Cells contain Bi-treated Plates and #293 $Ni(OH)_2$
Electrolyte: 21% KOH + 100 g LiOH
Full line: Output to 1V. at 30 amps. on 15-hour charge at 30 amps.
Dotted " " " " " 7-hour " "
Edison Laboratory 6/15/09 W.E.H.

Green – #B1
Red – #B2
Black – #B3



A4 CELL #774

Discharge after Standing, Compared with Normal Runs made Before and After the Stand Test.
Charge: 15 hrs at 30 amps; discharge rate: 30 amps.
Discharge #54 (Black) Discharge made 6 weeks after the charge.
" #49 (Red) Normal run made before stand test.
" #55 (Green) " " " after " "
Electrolyte: 21% KOH + 100 g. LiOH.
Edison Laboratory, 8/16/09. W.E.H.



A4 CELLS #643, 646, 775.

Curves Showing Output Obtainable in One Day by Supplementing the Normal Charge with a Double-rate Boost during the Noon Hour.

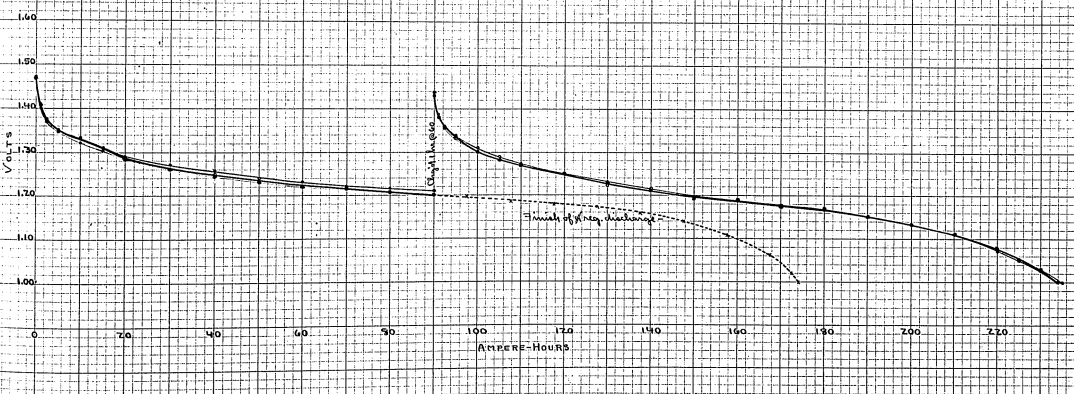
Run #110. Charged 17 hrs. @ 30 amps each, after 90 A-H discharge, 1 hr. @ 40 amps more. Discharge rate: 30 amperes.

Run #110: Total Input 270 A-H; 1st Output 234 A-H; A-H Eff. 86.7%.

Reg. run: " " 210 " " " 142 " " 93.0 "

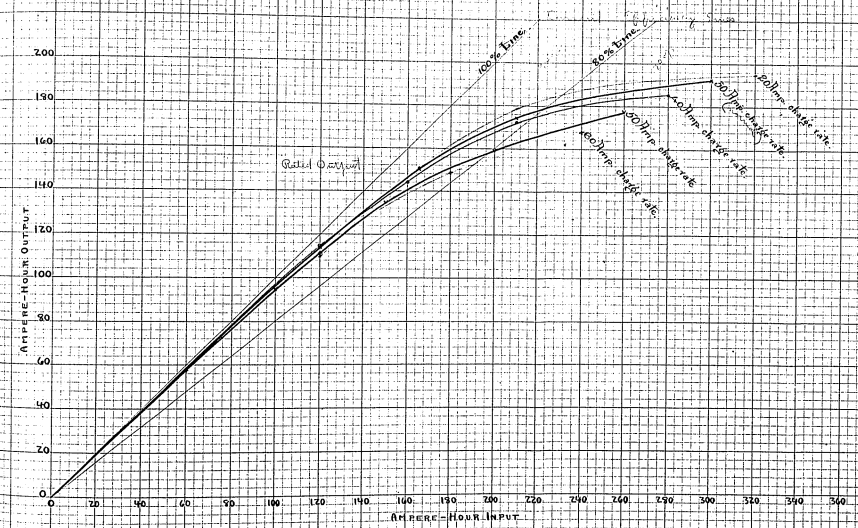
Edison Laboratory, 8/25/09. W.E.H.

Black - #643
Red - 646
Green - 775



Edison Storage Battery
Type "A" Cell.

Relation of Ampere-hour Output at Normal Rate to Ampere-hour Input at Different Rates.
Each point is the average result of two or more tests of three cells (6A2, 6A6, & 7A5).
Runs 171-220. The high rate charges were made first, and at each rate the tests were made on descending inputs.
Edison Laboratory 10/11 to 11/16-1909. Curve by - W.E.H.



Edison Storage Battery
Type A A Cell.

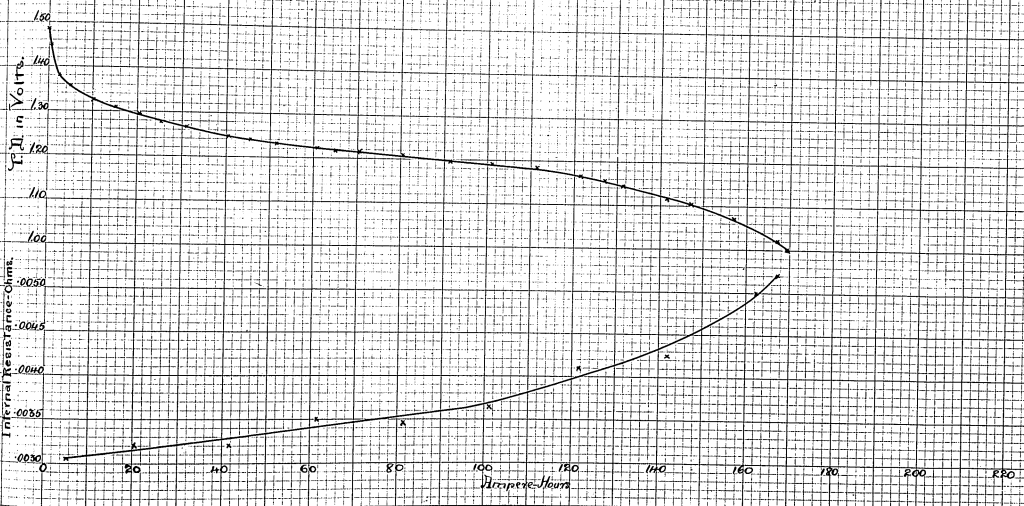
Internal Resistance Curve, calculated from voltage changes produced by 30 ampere increases of current.

Readings are the double average of two runs (233 & 234) of two cells (6 & 5 & 6 & 6)

Cells were charged 7 hrs. @ 30 amps. & discharged @ 30 amps, the rate during discharge being increased to 60 amps for 1 min. @ intervals of 10 min.

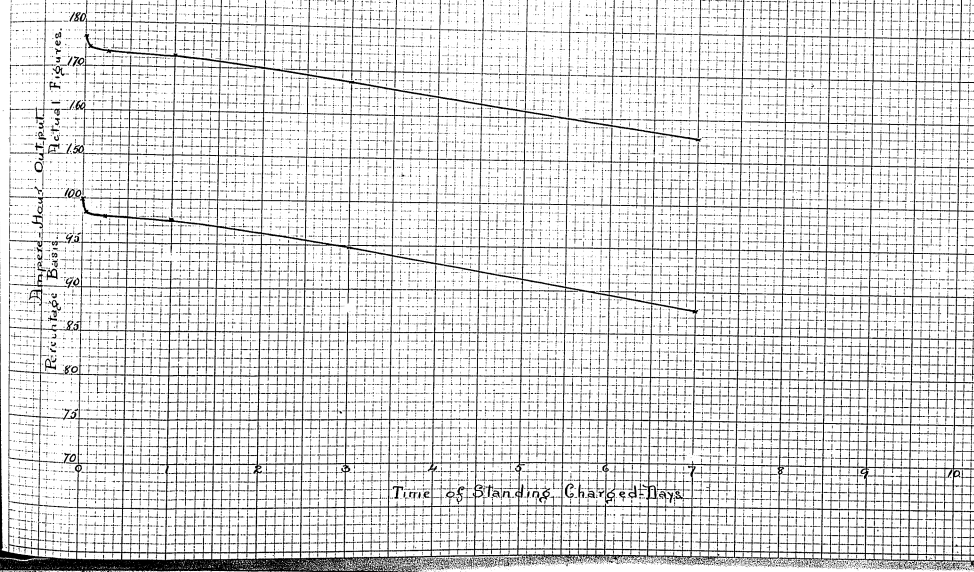
Edison Laboratory, 11-19-09. Curve by H.C. Approved by W.C.H.

Note: As these cells still contained their original solution after 2 years, it was probably quite weak.



Edison Storage Battery
Type A 4 Cell

Rate of loss of Charge on Standing (at Temperature of 75°F)
Charged normally, 7 hrs at 30 Amps; discharged to .9V at 30 Amps.
Points averaged from results of cells 6-4-5, 6-4-6, 7-7-5, runs 2-2-6 - 2-4-3 (The solution had not been renewed in these cells since the beginning, & it was probably quite weak.)
Edison Laboratory, 11/23 - 12/8 - 1909. Curve by H.C. Approved: T.E.M.



A.4 Cell #46

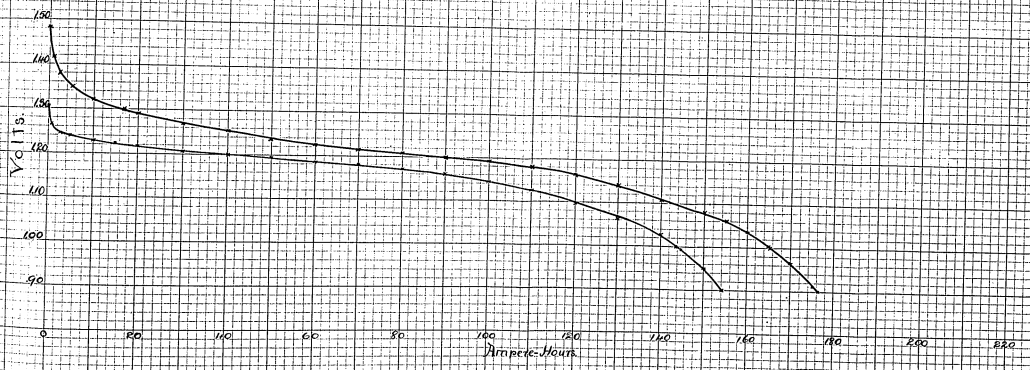
Discharge made One Week after Charge, compared with a normal Discharge.

Cell charged 7 hrs at 30 Amps; discharged to .9V at 30 Amps.

×Run #236. Discharge started 5 minutes after charge at a temperature of 89° F.

×Run #245. Discharge started 1 week after charge at a temperature of 75° F.

Edison Laboratory, 12-8-09. Curve by H.C. Approved: W.E.H.



"A4" Cell 643 Temperature Tests

Charges at 95°F - 50 Amps for 7 Hours

Discharges at 35°F, at different rates.

Run 294 (Black) Discharge rate 10 Amperes

" 296 (Red) " " 30 "

" 299 (Green) " " 50 "

" 302 (Violet) " " 70 "

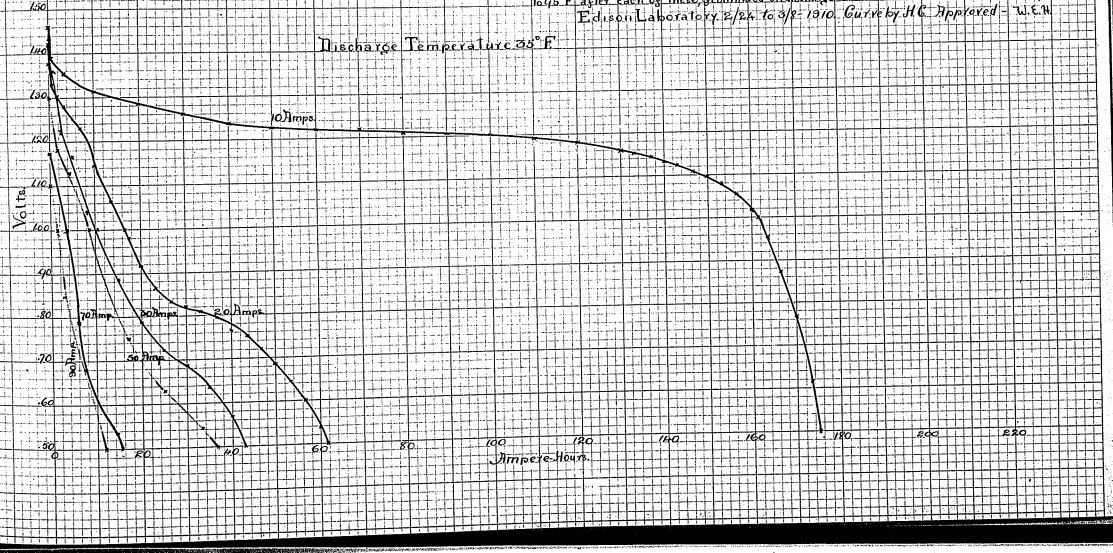
" 305 (Yellow) " " 90 "

" 305 (Blue) " " 20 "

The discharge was started one hour after the end of charge in each case.

As only a part of the capacity is given out on a cold discharge, the cell was warmed up to 95°F after each of these, & continued on discharge at the same rate until 50V was reached again.

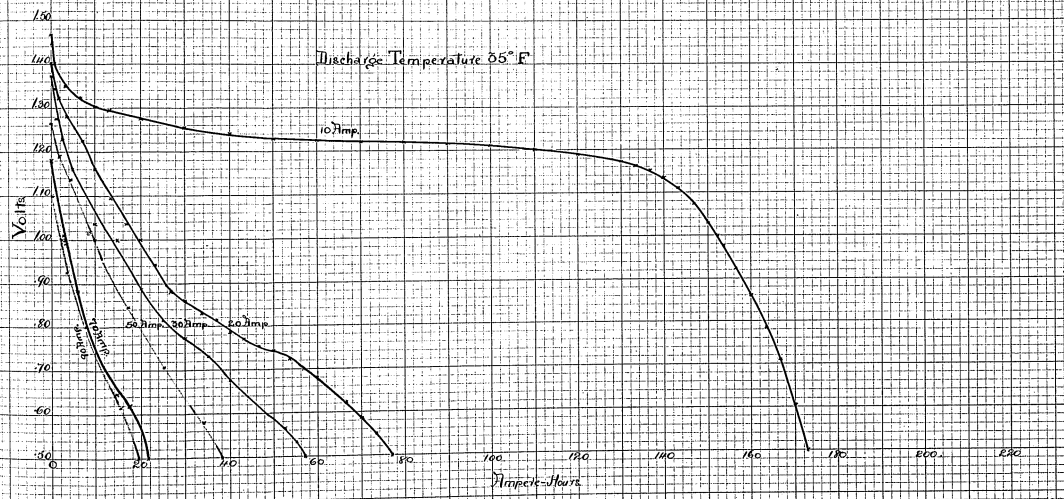
Edison Laboratory 2/24 to 3/8 - 1910. Curve by H.C. Approved - W.E.H.



A4 Cell B1. Temperature Tests

Charge at 86°F 30 Amps for 7 Hours. Discharges at 35°F at different rates.
The discharge was started one hour after the end of charge in each case.
As only a part of the capacity is given out on a cold discharge, the cell was warmed up to 96° after each of these & continued on discharge at the same rate until 50V was reach again.
Edison Laboratory, 2/Feb to 3/8 – 1910. Curve by H.C. Approved: W.C.H.

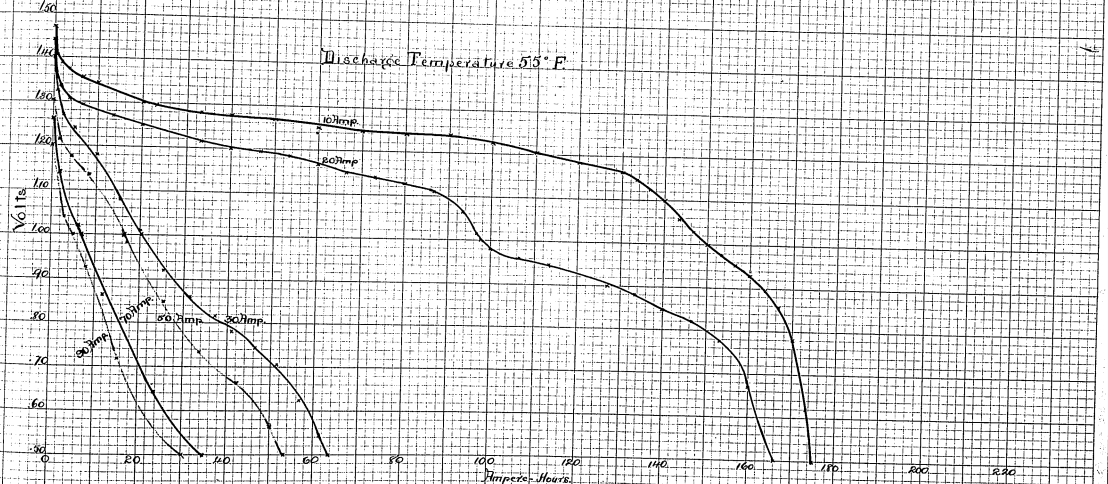
Run 312 (Black) Discharge rate 10 Amperes
" 316 (Red) " " 30 "
" 317 (Green) " " 50 "
" 320 (Violet) " " 70 "
" 321 (Yellow) " " 110 "
" 323 (Blue) " " 150 "



Run #307 (Black) Discharge rate 10 Amperes
" 307 (Blue) " " 20 "
" 313 (Red) " " 30 "
" 314 (Green) " " 50 "
" 317 (Violet) " " 70 "
" 318 (Yellow) " " 90 "

"H" Cell 643 Temperature Tests.

Charges at 95° F. - 30 Amps for 7 Hours - Discharges at 55° F. at different rates.
The discharge was started one hour after the end of charge in each case.
Only a part of the capacity is given out on a cold discharge, the cell was warmed up to 95° F after each of these & continued on discharge at the same rate until 1.8 V was reached again.
Edison Laboratory 3/11 to 3/25 - 1910 Curve by H. C. Approved V. E. H.

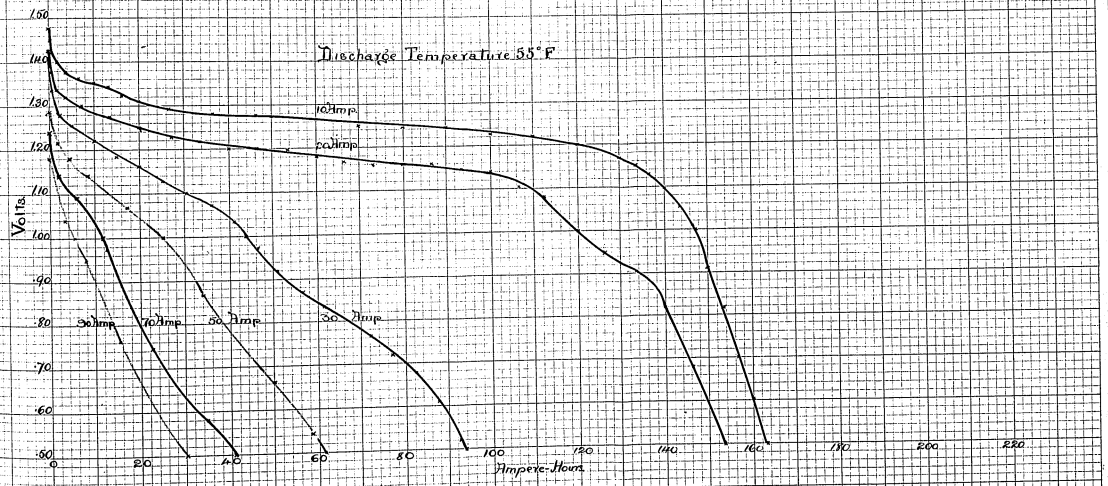


34" Cell. B1. Temperature Tests.

Charges at 105° F.–30 Amps for 7 Hours – Discharges at 55°F at different rates
The discharge was started one hour after the end of the charge in each case.
No only a part of the capacity is given out on a cold discharge, the cell was warmed up to 85°F
after each of these & continued on discharge at the same rate until .50V was reach again.

Edison Laboratory, 3/11 to 3/22–1910 Curve by H.C. Approved:- W.C.H.

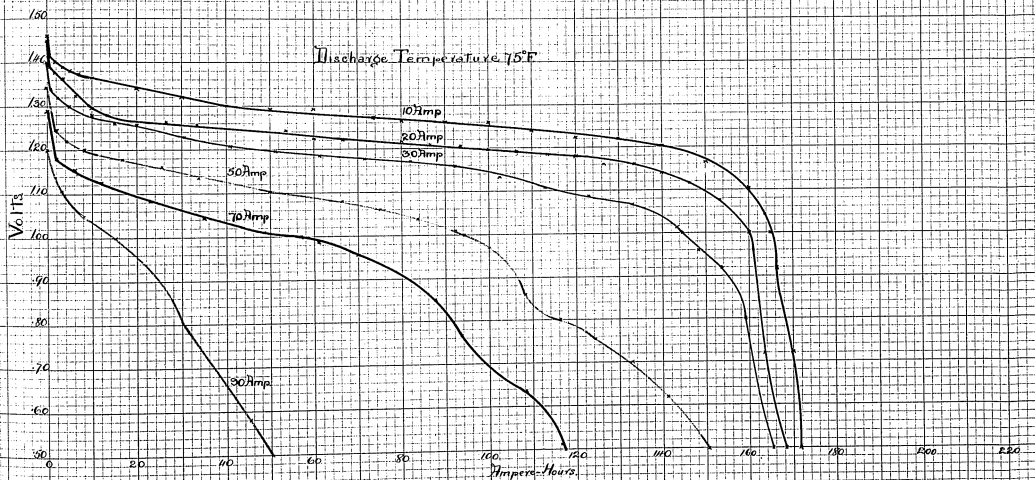
Run 326.(Black) Discharge rate 10 Amperes.
" 327.(Blue.) " " 20 "
" 301.(Red.) " " 30 "
" 302.(Green) " " 50 "
" 306.(Violet) " " 70 "
" 306.(Yellow) " " 90 "



"A" Cell 643. Temperature Tests.

Run 320 (Black) Discharge rate 10 Amperes.
" 321 (Blue) " " 20 "
" 322 (Red) " " 30 "
" 330 (Green) " " 50 "
" 331 (Violet) " " 70 "
" 333 (Yellow) " " 90 "

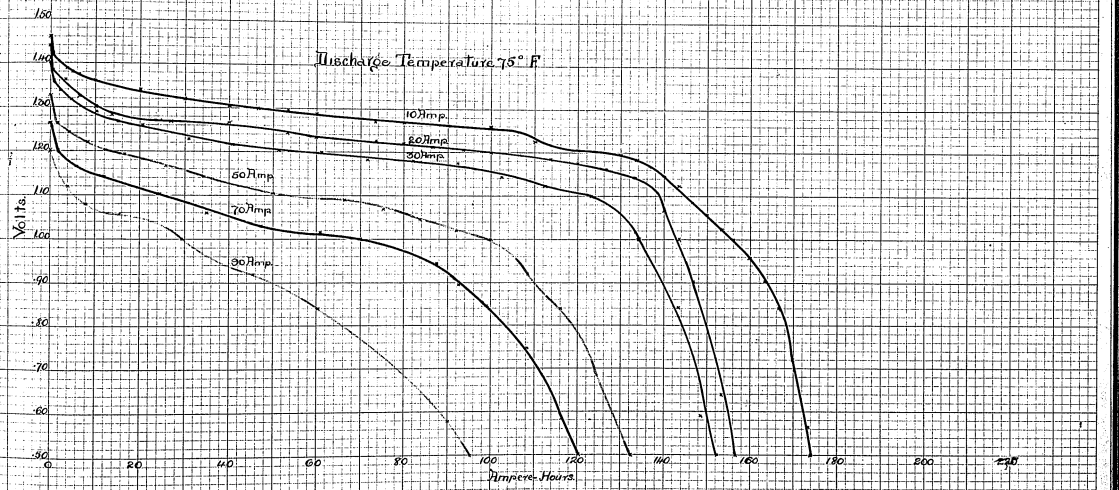
Charges at 135°F - 30 Amps for 7 Hours. Discharges at 75°F all different rates.
The discharge was started one hour after the end of the charge in each case.
As only a part of the capacity is given out on a cold discharge, the cell was warmed up to 98°F after each of these, & continued on discharge at the same rate till 50V was reached again.
Edison Laboratory, 3/28 to 4/5-1910. Curve by H.G. Approved - W.E.M.



A4" Cell B1 Temperature Tests.

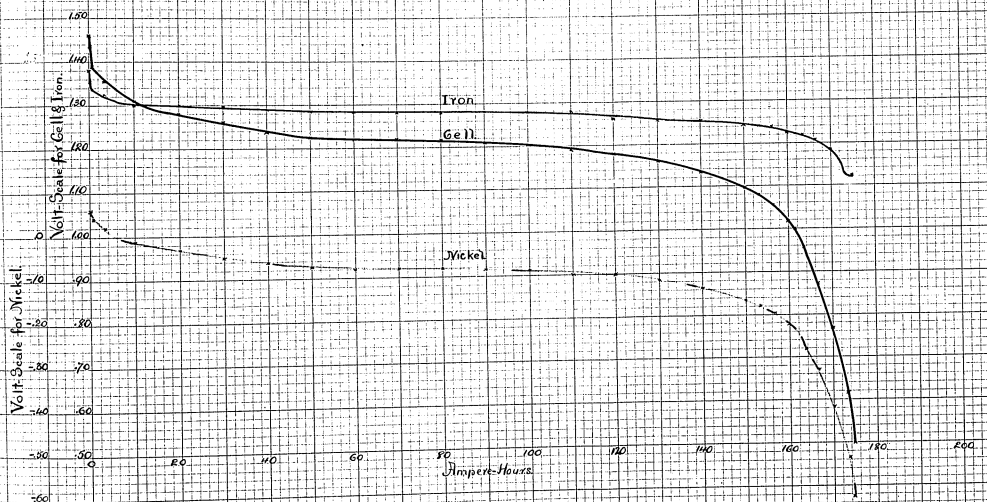
Charges at 95°F.–30 Amps for 7 Hours– Discharges at 75°F.– at different rates.
The discharge was started one hour after the end of charge in each case.
As only a part of the capacity is given out on a cold discharge, the cell was warmed up to 95°F. after each of these, & continued on discharge at the same rate until 50V was again reached.
Edison Laboratory, 3/25 To 4/5–1910. Curve by HC Approved– W.E.H.

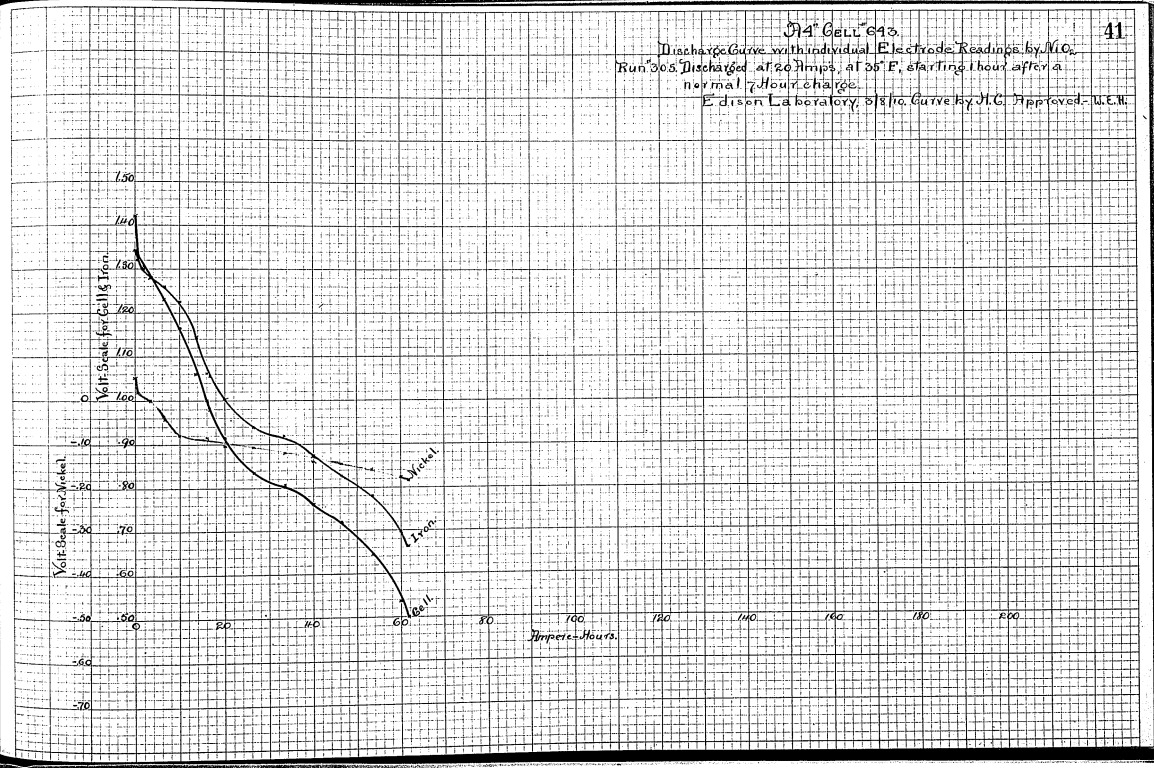
Run 333 (Black) Discharge rate 10 Amperes
" 332 (Blue) " " 20 "
" 333 (Red) " " 30 "
" 328 (Green) " " 50 "
" 329 (Violet) " " 70 "
" 327 (Yellow) " " 90 "



A4" Cell 643

Discharge Curve with Individual Electrode Readings by NiC_2.
Run 294. Discharged at 10 Amps, at 65°F starting 1 hour after the end of a normal 7 Hour charge.
Edison Laboratory, 2/21/10. Curve by H.C. Approved-W.E.H.




No 4 Cell 643.
Discharge Curve with individual Electrode Readings by M.O.
Run 305. Discharged at 20 Amps, at 35° F, starting 1 hour after a
normal 7 Hour charge.
Edison Laboratory, 3/8/10. Curve by H.C. Approved - W.E.H.
Volt Scale for Cell & Iron
Volt Scale for Nickel
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
.70
.60
.50
-.10
-.20
-.30
-.40
-.50
-.60
-.70
0
20
40
60
80
100
120
140
160
180
200
Ampere-Hours.
Nickel
Iron.
Cell.

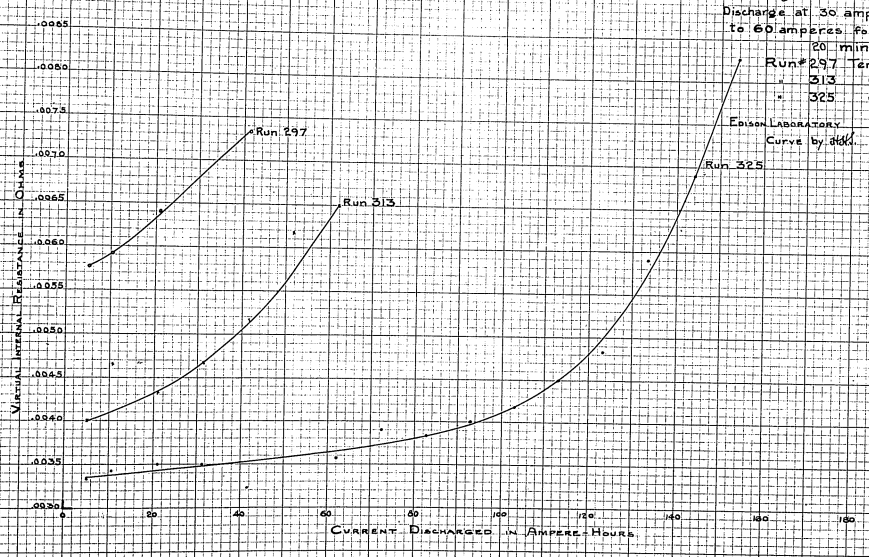
A-4 CELL 643

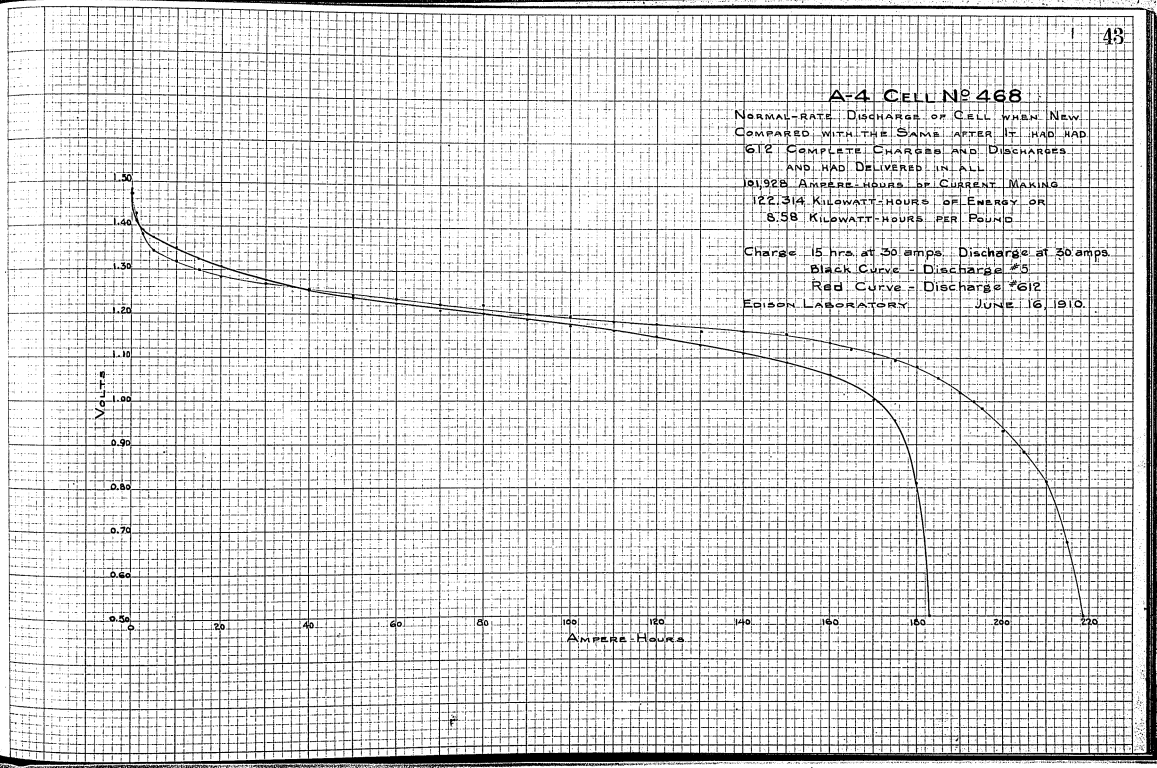
CURVES OF VIRTUAL INTERNAL RESISTANCE AT VARIOUS TEMPERATURES

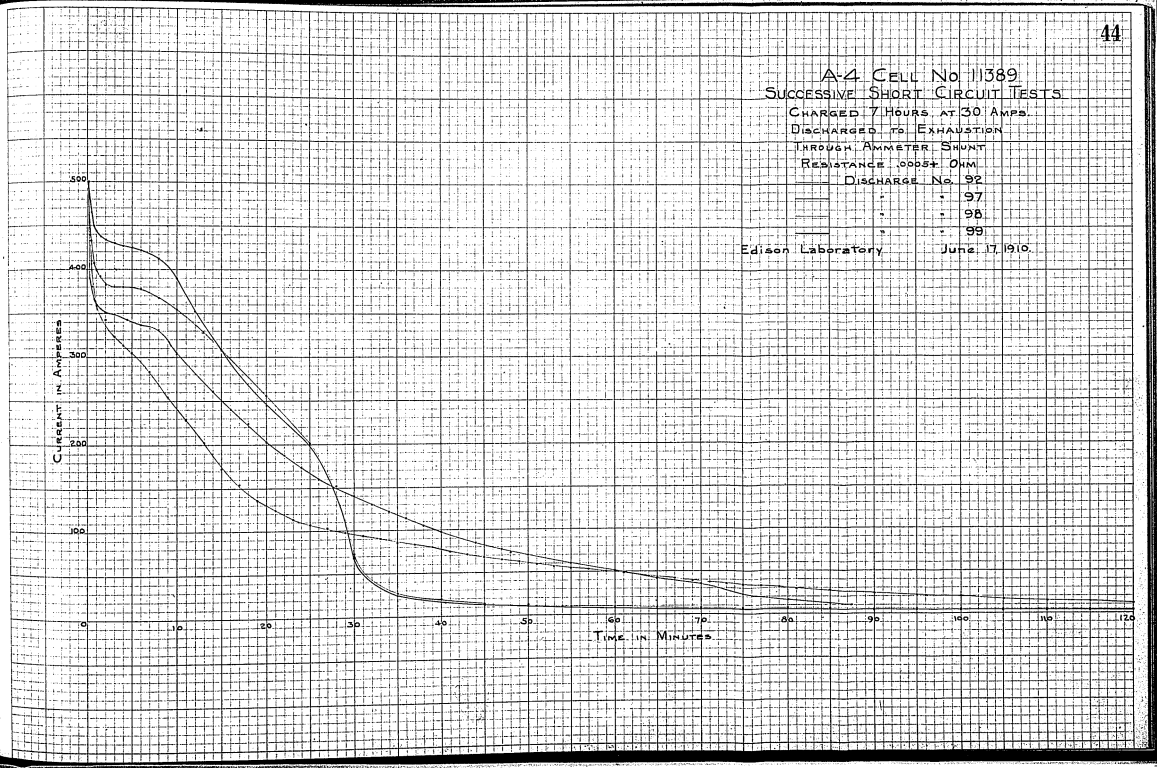
Charge 7 hours at 30 amperes.
Discharge at 30 amperes with increase to 60 amperes for ½ minute every 20 minutes.

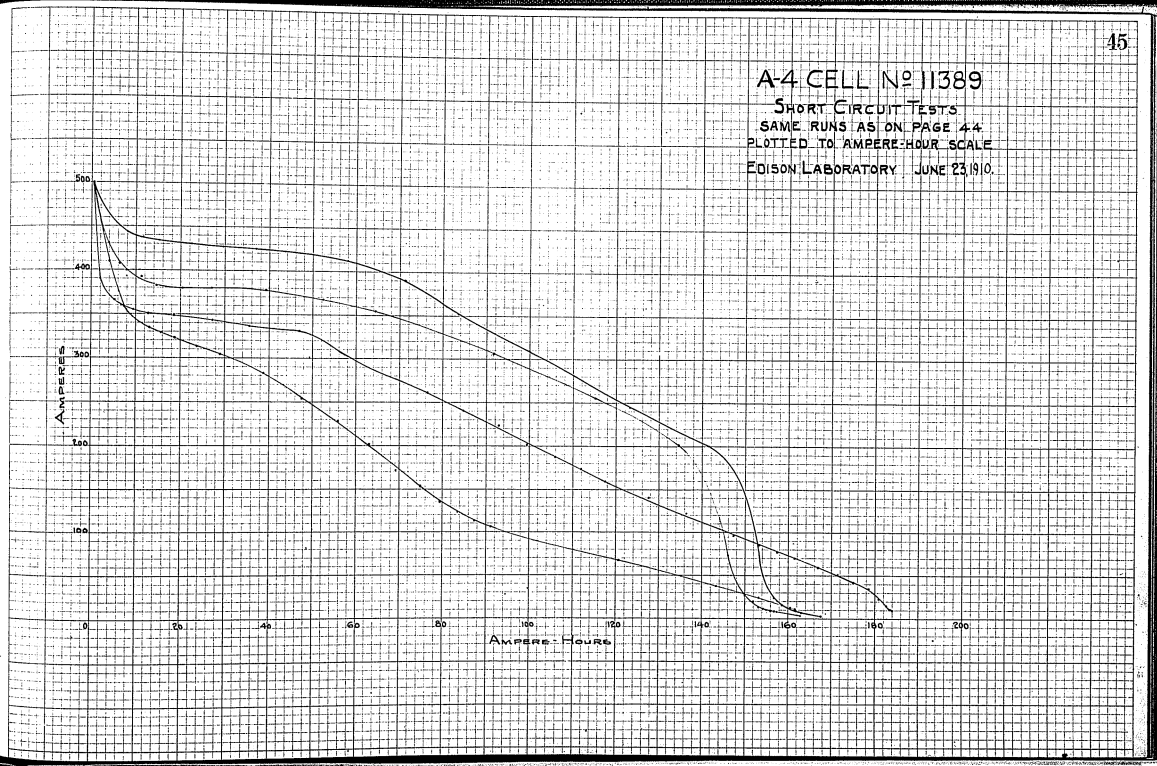
Run # 297 temp. 35° Fahr.
" 313 " 55° "
" 325 " 75° "

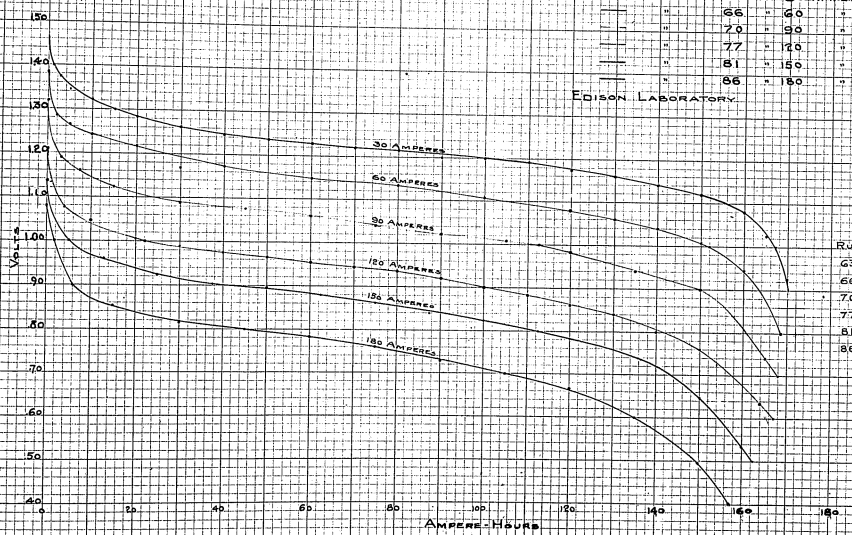
EDISON LABORATORY JUNE 15, 1910
Curve by [illegible] Approved




A-4 Cell No 468
Normal-rate Discharge of Cell when New
Compared with the Same after it had had
612 Complete Charges and Discharges
and had Delivered in all
101,928 Ampere-hours of Current Making
122.314 Kilowatt-hours of Energy or
8.58 Kilowatt-hours per Pound
Charge 15 hrs. at 30 amps. Discharge at 30 amps.
Black Curve - Discharge #5
Red Curve - Discharge #612
Edison Laboratory June 16, 1910.
Volts
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0
20
40
60
80
100
120
140
160
180
200
220
Ampere-Hours


A-4 Cell No. 1389
Successive Short Circuit Tests
Charged 7 Hours at 30 Amps.
Discharged to Exhaustion
Through Ammeter Shunt
Resistance .00054 Ohm
Discharge No. 92
" " 97
" " 98
" " 99
Edison Laboratory
June 17, 1910.
Current in Amperes
500
400
300
200
100
0
10
20
30
40
50
60
70
80
90
100
110
120
Time in Minutes


A-4 CELL No 11389
SHORT CIRCUIT TESTS
SAME RUNS AS ON PAGE 44
PLOTTED TO AMPERE-HOUR SCALE
EDISON LABORATORY JUNE 23, 1910.
AMPERES
500
400
300
200
100
0
20
40
60
80
100
120
140
160
180
200
AMPERE-HOURS



TABLE

RUN	AMP.HR. OUTPUT	WATT.HR. OUTPUT	AVERAGE VOLTAGE
63	170	205	1.205
66	168.3	188	1.116
70	168	170	1.011
77	167	151	.905
81	162.5	135	.831
86	157	115	.733

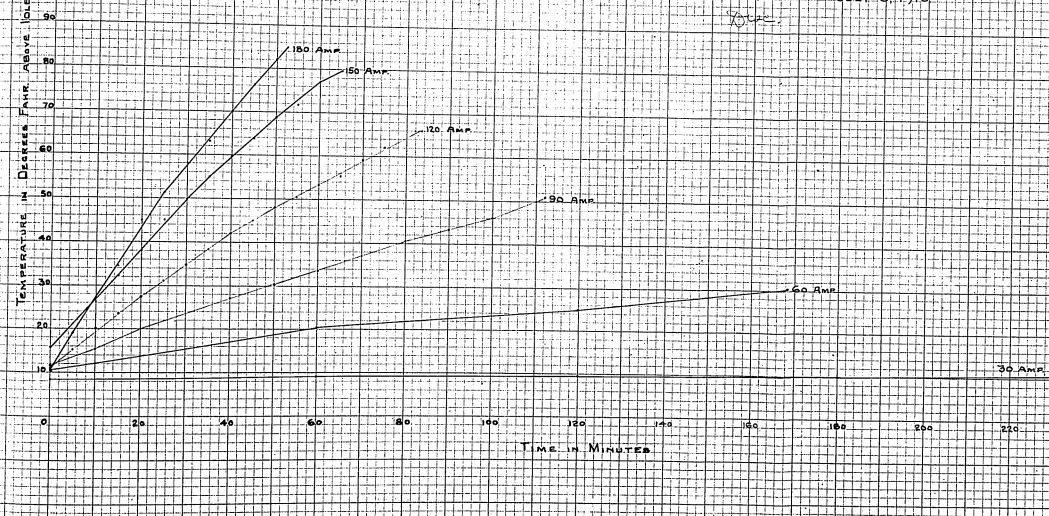
A-4 CELL No 11389

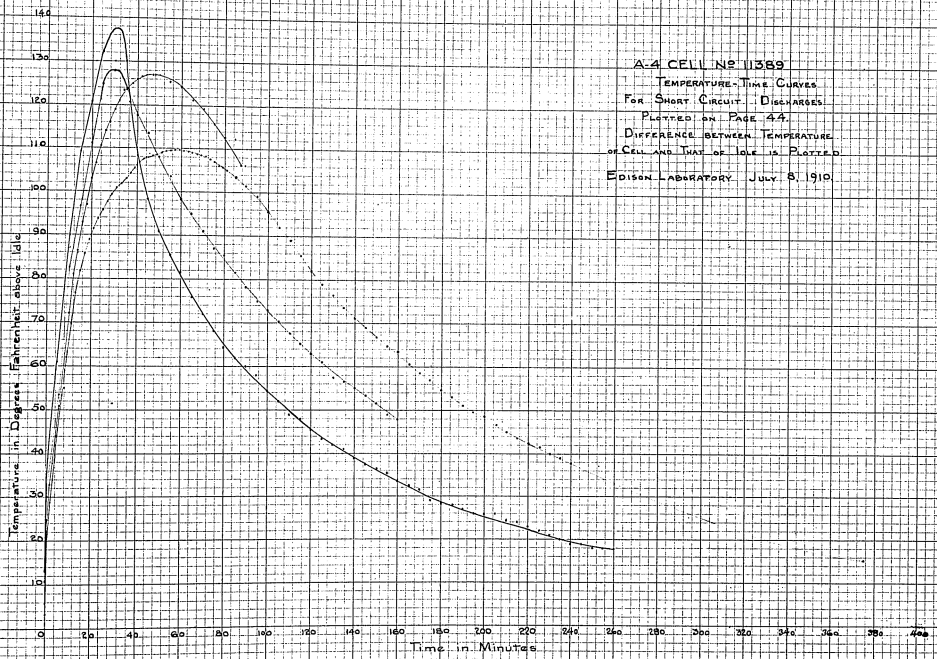
TEMPERATURE-TIME CURVES

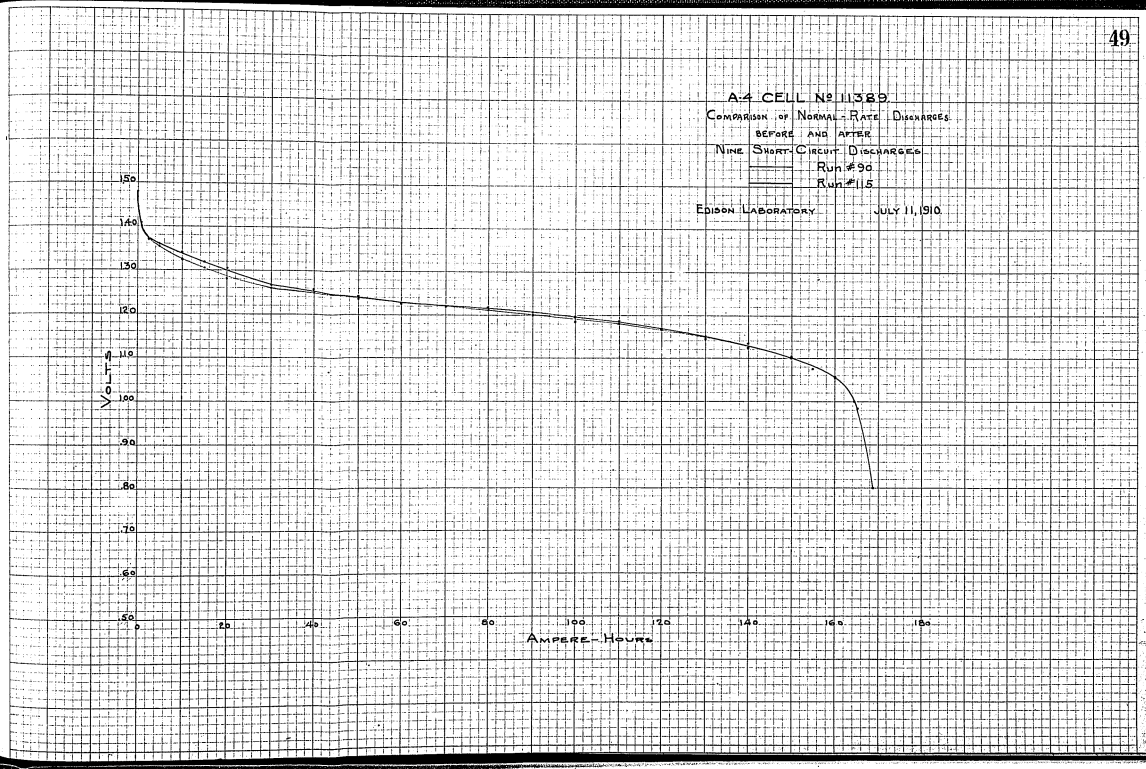
FOR RUNS PLOTTED ON PAGE 46

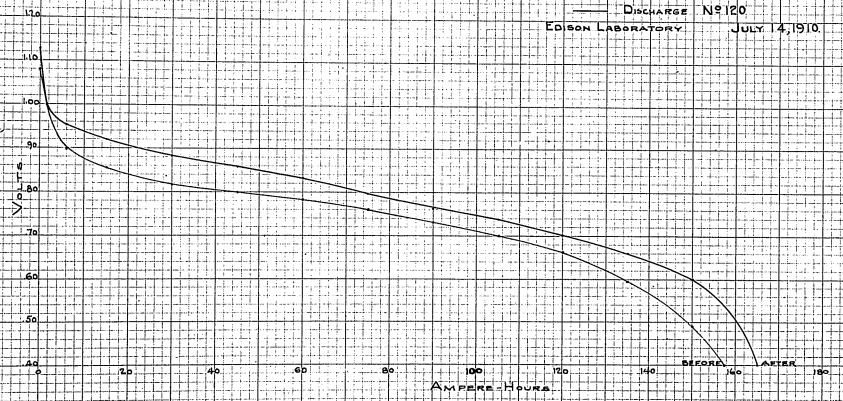
DIFFERENCE BETWEEN TEMPERATURE OF CELL AND THAT OF IOLE IS PLOTTED.

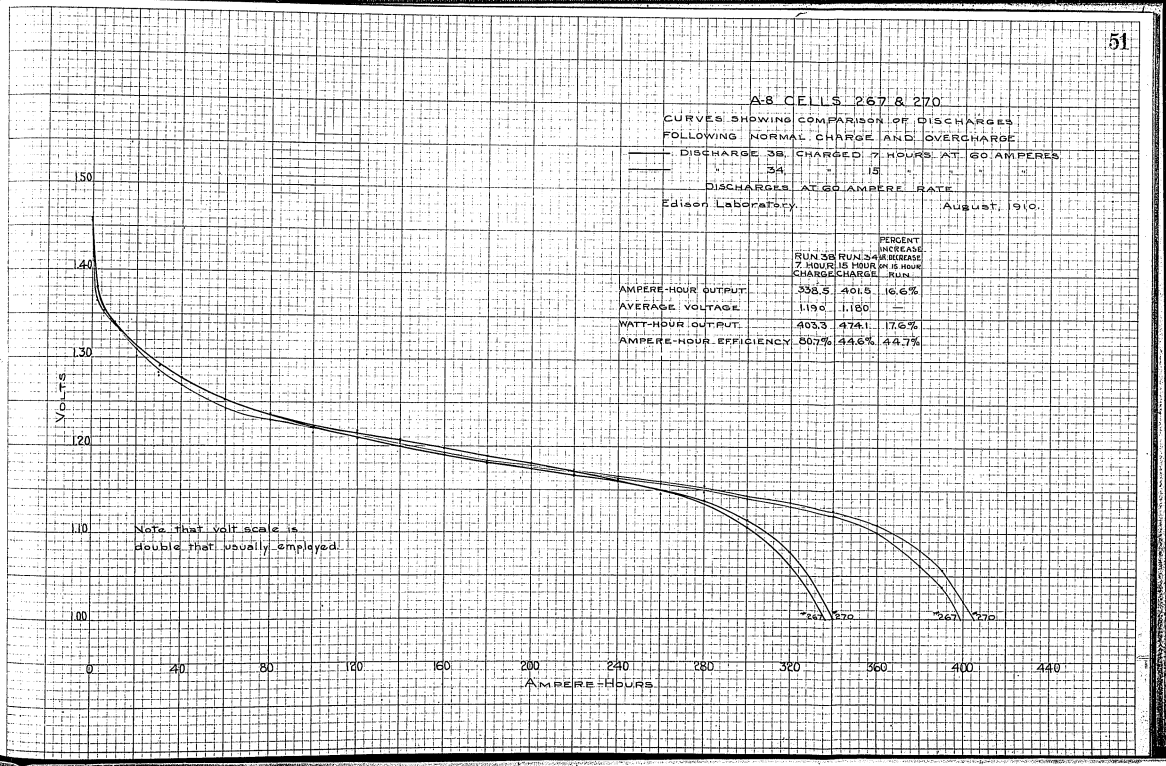
EDISON LABORATORY JULY 5, 1910

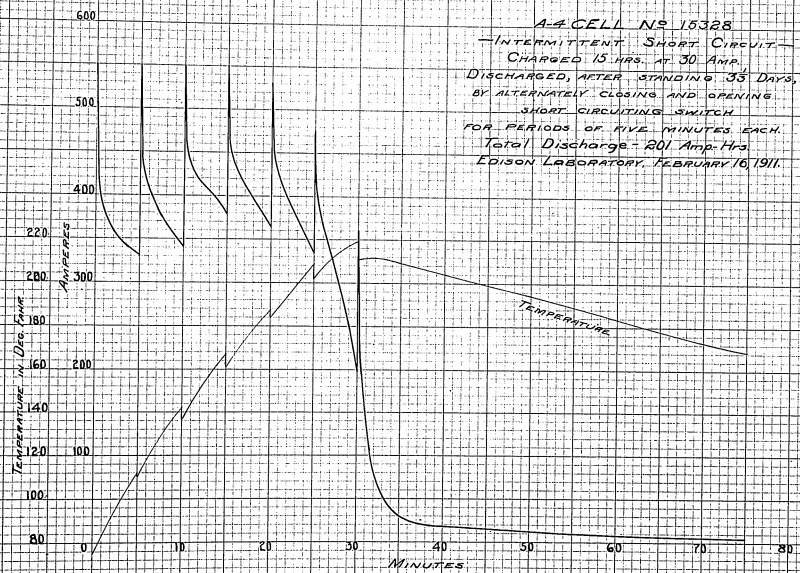



A-4 CELL No 11389
TEMPERATURE-TIME CURVES
FOR SHORT CIRCUIT DISCHARGES
PLOTTED ON PAGE 44.
DIFFERENCE BETWEEN TEMPERATURE
OF CELL AND THAT OF IDLE IS PLOTTED
EDISON LABORATORY JULY 8, 1910.
Temperature in Degrees Fahrenheit above Idle
Time in Minutes
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400


A-4 CELL № 11389
COMPARISON OF NORMAL-RATE DISCHARGES
BEFORE AND AFTER
NINE SHORT-CIRCUIT DISCHARGES
Run #90
Run #15
EDISON LABORATORY
JULY 11, 1910.
VOLTS
150
140
130
120
110
100
90
80
70
60
50
0
20
40
60
80
100
120
140
160
180
AMPERE-HOURS


A-4 CELL No 11389
COMPARISON OF HIGH RATE DISCHARGES
BEFORE AND AFTER
NINE SHORT CIRCUIT DISCHARGES
CHARGES 7 HOURS AT 30 AMP.
DISCHARGES AT 180 AMP.
DISCHARGE No 86
DISCHARGE No 120
EDISON LABORATORY JULY 14, 1910.
VOLTS
1.10
1.00
.90
.80
.70
.60
.50
.40
0
20
40
60
80
100
120
140
160
180
BEFORE
AFTER
AMPERE-HOURS.


A-8 CELLS 267 & 270
CURVES SHOWING COMPARISON OF DISCHARGES
FOLLOWING NORMAL CHARGE AND OVERCHARGE
DISCHARGE 38, CHARGED 7 HOURS AT 60 AMPERES
" 34, " 15 " " " "
DISCHARGES AT 60 AMPERE RATE
Edison Laboratory. August, 1910.
RUN 38 7 HOUR CHARGE
RUN 34 15 HOUR CHARGE
PERCENT INCREASE OR DECREASE ON 15 HOUR RUN
AMPERE-HOUR OUTPUT 338.5 401.5 16.6%
AVERAGE VOLTAGE 1.190 1.180 —
WATT-HOUR OUTPUT 403.3 474.1 17.6%
AMPERE-HOUR EFFICIENCY 80.7% 44.6% 44.7%
Note that volt scale is double that usually employed.
VOLTS
1.50
1.40
1.30
1.20
1.10
1.00
0
40
80
120
160
200
240
280
320
360
400
440
AMPERE-HOURS
*267
270
*267
270


A-4 CELL No 15328
—INTERMITTENT SHORT CIRCUIT—
CHARGED 15 HRS. AT 30 AMP.
DISCHARGED, AFTER STANDING 33 DAYS,
BY ALTERNATELY CLOSING AND OPENING
SHORT CIRCUITING SWITCH
FOR PERIODS OF FIVE MINUTES EACH.
Total Discharge = 201 Amp-Hrs.
EDISON LABORATORY, FEBRUARY 16, 1911.
AMPERES
600
500
400
300
200
100
TEMPERATURE IN DEG. FAHR.
220
200
180
160
140
120
100
80
0
10
20
30
40
50
60
70
80
MINUTES
TEMPERATURE
Run. 87

Chemistry Notebook

This notebook was used by Edison in May 1907 to test the solubility of several lithium compounds. The book contains 152 numbered pages, only one of which has been used.

May 12 1907.

Solubility of Li_2CO_3 in

15% KOH. 100 cc saturated solution contains 2.443 grmo Li_2CO_3
Equivalent to .991 grmo Li_2O

15% NaOH " " Contains 2.475 grmo Li_2CO_3
Equivalent to 1.002 Li_2O

21% KOH. " " Contains 2.714 Li_2CO_3
Equivalent to 1.099 grmo Li_2O

Dr Grothe

Solubility 100 cc solution saturated LiOH

15% NaOH	3.295 Li_2O
	5.269 LiOH
15% KOH	2.291 Li_2O
	3.668 LiOH
10% KOH.	1.882 Li_2O
	2.918 LiOH
21% KOH.	2.858 Li_2O
	4.573 LiOH

Dr Grothe.

UNBOUND NOTES AND DRAWINGS

These loose items relate to a variety of subjects, including the development, manufacture, and use of storage batteries, phonographs, and phonograph records. Also included is material pertaining to experiments with various chemical processes, acoustic and electromagnetic devices, concrete construction, and the development of a synchronous-play phonograph and kinetoscope called the kinetophone. Many of the items are by Edison. There is also material by John F. Ott, George E. Small, Albert F. Wurth, and other employees.

The notes and drawings are arranged in three groups: (1) Dated Notes and Drawings; (2) Undated Notes and Drawings; and (3) Oversize Notes and Drawings.

Dated Notes and Drawings. These folders are arranged by year. Within each folder, the dated items appear chronologically, followed by undated Edison material plausibly attributed to that year and then by undated non-Edison material.

Undated Notes and Drawings. This folder consists of undated items unassignable to any specific year but probably dating from the period 1899-1910.

Oversize Notes and Drawings. This folder consists of blueprints, linen drawings, and sketches by draftsmen and other Edison employees that are too large to be reproduced at the standard reduction ratio of 14:1.

Unbound Notes and Drawings (1899)

This folder contains dated notes and drawings from 1899, as well as undated material possibly from the same year. Included are 2 pages of notes by Edison, one regarding the chemistry of storage batteries and the other probably about the chemical composition of phonograph record blanks. Most of the other items are meter test logs, possibly by Ralph Vose.

Unbound Notes and Drawings (1900)

This folder contains dated notes and drawings from 1900, as well as undated material possibly from the same year. Included are many chemical notes by Edison, some pertaining to the composition of phonograph record blanks and many involving nickel and other metals. Also included are drawings by Edison of phonograph parts, bricker ovens, and other devices, along with lists of experiments and tasks to be performed at the laboratory.

Unbound Notes and Drawings (1901)

This folder contains dated notes and drawings from 1901, as well as undated material possibly from the same year. Included are items by Edison regarding surveying devices, phonographs, and storage batteries, many of which contain dates, notations, or contributions by John F. Ott. There are also pages of calculations by an unidentified experimenter.

Unbound Notes and Drawings (1902)

This folder contains dated notes and drawings from 1902, as well as undated material possibly from the same year. Included are drawings by Edison of experimental apparatus pertaining to x-rays, electromagnetism, and telephony. There are also documents relating to fluorescent lighting, electric meters, phonographs, and an electric furnace. Many of the Edison drawings include dates, notations, or contributions by John F. Ott. Several contain notations indicating their use in the patent interference case, *Edison v. Macdonald* (see Legal Department Records, Legal Series), and some bear an archivist's inscriptions.

Unbound Notes and Drawings (1903)

This folder contains dated notes and drawings from 1903, as well as undated material possibly from the same year. Included are items by Edison, John F. Ott, and others pertaining to phonographs, phonograph records, electrical meters, kinetoscopes, and other matters. Some of the phonograph material involves a disc phonograph. Several items were witnessed by Ludwig F. Ott and Frank L. Dyer.

Unbound Notes and Drawings (1904)

This folder contains dated notes and drawings from 1904, as well as undated material possibly from the same year. Included are numerous undated items by Edison, John F. Ott, and others regarding the layout and machinery of the Edison Storage Battery Co. plant. These documents probably relate to the concrete factory building erected next to the West Orange laboratory in 1904. Also included are two drawings pertaining to phonographs.

Unbound Notes and Drawings (1905)

This folder contains one drawing of a phonograph horn. The horn was constructed by Adelburt Theo E. Wangemann and drawn by Edgeworth Greene.

Unbound Notes and Drawings (1906)

This folder contains 2 pages of notes and drawings, probably by Edison, regarding phonographs. They were witnessed by John F. Ott in December 1906.

Unbound Notes and Drawings (1907)

This folder contains dated notes and drawings from 1907, as well as undated material possibly from the same year. Included are numerous notes from Edison to John F. Ott pertaining to storage batteries, phonographs, telephone devices, electric vehicles, and other matters. These items were probably written at Edison's winter home in Fort Myers, Florida, and then forwarded to the laboratory in West Orange. Also included are notes and drawings by Edison and Albert F. Wurth regarding Edison's kinetophone and various notes, memoranda, and calculations by Ott.

Unbound Notes and Drawings (1908)

This folder contains dated notes and drawings from 1908, as well as undated material possibly from the same year. Included are items by Edison, Ludwig F. Ott, George E. Small, and other employees pertaining to storage batteries, phonographs, and Edison's planned concrete house. The majority of the documents are Small's notes regarding measurements, patterns, and molds for the house.

Unbound Notes and Drawings (1909)

This folder contains dated notes and drawings from 1909, as well as undated material possibly from the same year. Included are items by Edison, John F. Ott, and other employees pertaining to molded phonograph records and the possible use of storage batteries by local railroads.

Unbound Notes and Drawings (1910)

This folder contains dated notes and drawings from 1910, as well as undated material possibly from the same year. Included are notes and calculations by Edison regarding the use of storage batteries by railroads, along with items pertaining to phonographs and motion pictures.

Unbound Notes and Drawings (Undated)

This folder contains undated notes and drawings, probably from the period 1899-1910. Included are items by Edison regarding storage batteries and the layout of a battery manufacturing plant. Also included are a group of drawings by Edison, found with the label "magnetometer descriptions"; an unfinished draft of a patent application for molded disc records; and a lengthy set of draft specifications and calculations by an unidentified employee.

Oversize Documents

Among the unbound technical notes and drawings for the period 1899-1910 are many oversize blueprints, linen drawings, and sketches by draftsmen and other Edison employees. Included are plans for machinery, tools, patterns, and parts, as well as several Edison products, like the Home Phonograph (1900) and the Edison-Saunders reheater for compressed air (1899).

Unbound Notes and Drawings (1899)

This folder contains dated notes and drawings from 1899, as well as undated material possibly from the same year. Included are 2 pages of notes by Edison, one regarding the chemistry of storage batteries and the other probably about the chemical composition of phonograph record blanks. Most of the other items are meter test logs, possibly by Ralph Vose.

Only the Edison documents have been selected.

Kruger of Berlin says nickel can be deposited in shiny equivalent to Rolled Ni in durability etc. Method is to acidify Ni solution with a minimal acid unalterable by the current — This would spoil the bath but is overcome by keeping temp Sol over 30 deg Cent

Syrian Asphalt + various amounts of Oleanic acid

Syrian Asphalt + various amounts of Black Ozocerite,

Unbound Notes and Drawings (1900)

This folder contains dated notes and drawings from 1900, as well as undated material possibly from the same year. Included are many chemical notes by Edison, some pertaining to the composition of phonograph record blanks and many involving nickel and other metals. Also included are drawings by Edison of phonograph parts, bricker ovens, and other devices, along with lists of experiments and tasks to be performed at the laboratory.

Approximately 50 percent of the documents have been selected. Among the items not selected are notes by George R. Ficht regarding a coal crushing plant and numerous meter test logs.

1900-04-11

Extr Cardui Benedic
Stiff paste dont puff much
nearly all charcoal -
not shiny - very little
smoke = little boiling more
than Belladonna =

Extr Wormwood -
boils puffs - some smoke
not shiny -

Extr Cinchona Gale gray
Cold process - shiny - puffs
Enormous - ~~Ed~~ = the stuff is
Ropy - transparent like Molasses
Candy -

Extr Matico Spirit -
Melts somewhat - very
little boil hard charcoal
somewhat shiny - some smoke
pbly good - stuff is hard but
unctious -

Extr Shamrocum Spirit -
hard - pbly good - moderate shiny Char

Extr Cinchona - melts
boils - ——

Extr Capit - Papaver -
Dont melt very much puffs some
no smoke - might do -

Extr Columbo - just like Caoutchouc. Elastic dont puff much hard Charcoal - not shiny some ash - might burn

---

Extr Jugland & Cort Nuc
dont melt, puffs little some ash might do -

Extract Bryonia
Soft - puffs - great deal white ash - Spirit Ext might do -

Extr Aconit & Succo -
Hard - puffs some might burn some ash - Red -

Ext Phalaris Aqu dry 11.
dont melt. Enormous ash - Easily oxidized Charcoal burns all way pbly on cut ash

Extr Ralanthia - pure in Lamellae - glass like elegant dont melt puffs very little, large ash - burns very slowly - pbly ng without ash) get out a lime salt pbly -

---

Resorcin - Melts (to be burn) Burns

Tropaeolin - shiny char good - dont melt puffs little, powder - dry -

Carmine infusible -
great amount ash - Easily
burned Charcoal if that
ash got away pbly OK.

Aniline Rotti (Scharlach)
Dont fuse no ash - tindery

Nigrosin alc lösl -
Seems fuse prob little dont
tinder no ash. not shiny -
might work =

Anilin Gelb -
Martius - ashy
Nitro Compd Explodes -

Rosaniline - Melts, boils
large part goes away -
Some of that shiny stuff left

Nigrosin Sal Water
Dont melt Carbs completely
dont even stick together
it powders dont tinder
Charcoal dead black
Something in it -

Anilin Red Comp. dont
melt. dont stick together little
tindery not shiny - might do

Ext Senkiance –
Melts boils puffs – very shiny if could be conc by the compg it might answer

Anilin Braun (Vesuvian) puffs greatly but shiny charcoal if puffg could be got out by cooking & partially degassing & the residuary turned to O/C

Hydro Quinone CP melts ng

Murexide – dont melt. scarcely any fusion hard shiny charcoal, seems to be A1 O/C

Pepsin puffs somewhat not very shiny char – might do.

Ammonia Benzoic Melts ng

Antifungin dont melt dont fuse, most difficult Carbg Substance I ever saw – requires full red heat, Charcoal dense fairly shiny – dirty manganese mt

Anthrachrion Melts ng

Naphthalamin Chloride
Sublimes ng

Phenolphtalein - melts
but about 25-pct residue
Shiny Carb —

Methadiamidobenzol
sublimes ng

Sulphtalamin 1/2 goes way
other 1/2 blacks but hard
not prfd — may do

Piperine ng —
melts —

Salol - Melts 1.2 ng

Aloin - Melts puffs ng

Santonin Melts ng.

Cimicifugin Melts
somewhat puffs much
blacks Char tindery

Podofo - after Podofo goes
off char hard not much
of it - might do for getting
Podofo to asphalt Easy

Chloral Cyanhydrat ng

Acid phtalic Melts ng

Anthrarobin Melts semi
puffs stand. high temp
Char fairly, shrg not
much good 9 grams

Acid Sulpho-anilic Cryst which
dont melt infusible. Keeps
shape Crystals - if char could
be made Salvable it might
be a dandy

Protein semi Melts puffs
Char not shrng

Extr Trifolii Fibrini
puffs - ng

Ox gal ng -

Extr Couchgrass puff
too much

Extr Aloes Cape puff too much - shrinking Canba

Extr Ignatia puffs too much Semi fuses -

Extr Calabar Semi fuses puffs too much -

Extr Colocynth puffs - Char hard - might answer

Extr Monesia bark ag - Mont fuse hard - may do

Extr Hyoscyamus. Liquid puffs Enormous pbly on account water pbly ng

Hydroxylamine Hydrochlor melts ng -

Ur-Ethane - melts ng

Conglutin - fuses puffs enormous melts ng

Indigotin - Volatilizes

Lactucae Extra -
Puffs - but possibly could be
cooled down but - on Carbs
it puffs badly - leave large
quantity of not shiny charcoal

Extract Calendula same
as Lactucae -

Extract Belladona from juice - Carbs melted
melting puffs scarcely any
1st class Charcoal not very
shiny - stands red heat
still little soft -
dont puff on heating

Extract Marrubii - dont melt
puff more than Belladona -
poly cause its got more water in
it brought to same Consistency and
poly act like Belladona

Diphenylamin Sulphate
melts. Residue then Carbs
Shiny so pot residue -

Furfurin - melt no

Bromal Hydrate melts -
all goes away

Ext Dandelion -
semi fuses puffs ~~[illegible]~~
not shiny

Extr Digitalis - puffs
Alcoholic Extr might work
DK - abundant residue
not shiny

Alkannin - Insipaled
Melts Liq. boils - inflam
gas but residue say 30 pct
gives very shiny Car
A very hard deposit -

Extr Licorice - Clean Sal -
pyr Crude Extr - puffs
Lundberg -

Extr Stramonii -
puffs greatly - not shiny

Extr Duboisiae - Spiss -
puffs but Carb hard -
Alcohol Extr may work

Extr Chamomillae
puffs but very hard Carbon
Alcol Extr may do -

Extract Malt - is Excellent
puffs badly but Terribly
shiny hard
puffs - Alcohol Extr may do
or some other solvent phenol
puffs

Aniline Blau - Naphthalin
Dont fuse Carb; Carbo Tinctory
may do for mixing —

Fluorescein - melts
puffs - no —

Hydrochloral Rosanaline -
Hard Cryst puffs considerably
hard Carb - not very shiny -

Aniline Orange
Helianthin
puffs not very shiny
or hard

Eosin - infusible -
Carb wholly - not shiny
Hard Carb good.

Aniline Gelb -
Manchester.
Carb fairly - Procedure
most Lime - no -

Aniline Green
Brilliant - melts
puffs flaky shiny not large
Residue pasty no

Aurin - Metts puffs greatly porous shiny Char -

Aniline Chlorat Metts
neg -

Aniline Roth puffs little not very shiny
can not hand
might do doubt it

Aniline Chrysoidin:
puffs somewhat - shiny
porous Char many ends

Aniline green Malachit metts.

Dimethylaniline orange
puffs - shiny -

Aniline Orange Methyl free
from arsenic scarcely any
puff - hard - good - Nothing

Aniline Blau - phenyl
puffs shiny porous -

Aniline Brown Bismark
puffs great very shiny -

Anilin yellow - Premal -
pufs tendency ng

Rosaniline acetic
pufs - ng

Anilin Blue Methylene
pufs greatly very shiny

Anilin Yellow - Naphthalin
explodes full Lumi.

Extr Dry Belladona
good - little lumiency
not shiny -

Extr Jalap aqua -
pufs - hard Carb not shiny
may do -

Anilin Green - good -
pufs - shiny - poison

Pyrogallolein Meth ng

Trichlorphenol melting

Extr Hydrocotyle -
shiny do in blood -
Hard Carb - dif to Carbon
something must -

Carbonate - puffs considerably
rather thing - not hard -
not so good as many the
things tried.

Litmus dont swell
Carbon keeps shape scarcely
anything Comes off - dense
dark Carb - apparently not
much ash good -

Campechy Extract,
swells act like Carbonate
Shiny porous - fair
Alcohol might res

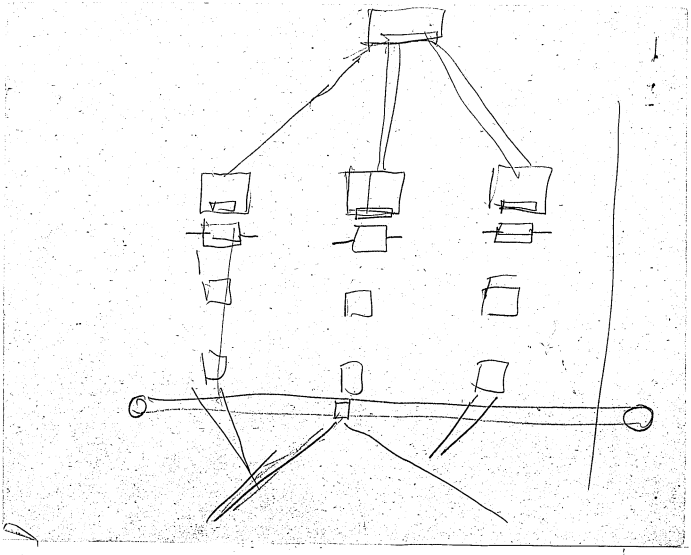
Solvents for Carbonate
pyridine good -
Benzil Aldehyde ~~elegant~~ good
Furfural good -
Styrene - Extra good as it can be
made thicker than any heretofore
tried - the liquid is also very thick
more carbon can be worked into lump &
thinks at least double. & notice
that even after dough very hard it will
often showing a gradual action
liquid not volatile except with heat
It dont seem to dissolve it in one sense
but make it stick together tenaciously

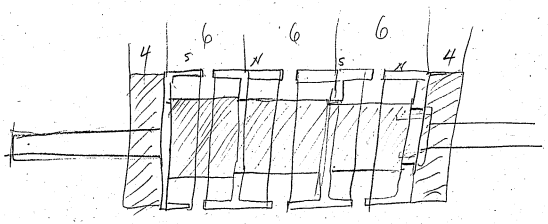
Mucerexcide - Aseptol very slightly
"

Eosin & water good no puff
dense Carb - Eosin may have
an inorganic material in it if
not good -

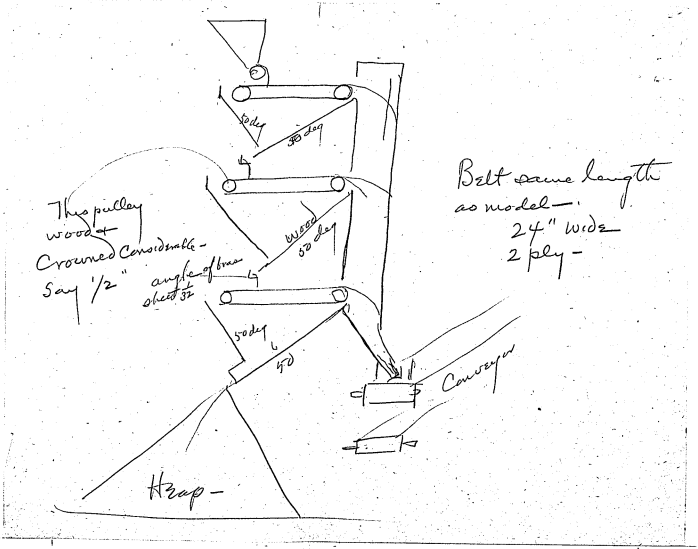
Aniline Red Congo dont
puff in least great deal
smoke comes up. Calcrack
on Carbz. Sal water to fair
but brittle dough. Think its
good — pyridin makes a
more tenacious dough
with pyridine Carbon more tendency
dont ~~[illegible]~~ puff in slightest,

Styrene not quite so tenacious
as with water dont swell
by tinding seems to be
considerable part of incorporation
in it —





This is same as model
but the diameter is increased
25% & everything else in
proportion —


50 deg
50 deg
Belt same length as model -
24" wide
2 ply -
This pulley wood +
Crowned Considerable -
Say 1/2"
angle of bar sheet st
Wood 50 deg
50 deg
40
Conveyor
Hzap -

Mr Ott:- two presses as per model
I understand you are making
the following for Blank Plant

40 Cooling Jackets-
1500 Iron Cores
14 Dipping Machines
Jacket Coolers Shells
6 holes each
for Cooling Jackets

Nov 19, 1900

Lanolin — for Oil Clear Mellow
Chinese Wax [illegible]

Erucin Rape oil
Cetyl palmitate Spermaceti
Myricyl palmitate Beeswax
Ceryl Melissate Chinese wax
Dodecatyl Sperm oil + Bottlenose oil
Ricinolin Castor oil —
Olein Elaidin — solid

Arachidic acid higher melting point than Stearic acid — 75c

Cold cleansing dissolves adhering oil on skin + then it now cuts it is pure
Cetyl palmitate

Myricin Chief part Beeswax — is insoluble in alcohol —
Ethyl Stearate, Wax like Easy fusible —

With Electrograph Cylinder with Sr Ba Li Na Hydroxides. also NH_3 - Sol of
Carb Soda, Borax pyridin,
Put boys finishing chemicals to make chalks, those not on hand and to improve
& also make fulcrat much tools —

Propane freezing Tungstates, Molybdates. Chromates, Arsenites, Chromates,
Zinkhexacyanide, Magnesia hydroxide. — Try the Ni Ox in other room —
Try BaO_2 Cylinder moist with Ba OH, & put in CO_2 recommit the contents
porcelain nearly filled with $BaCO_3$ — . Try $BaCO_3$ for cutting for phone.
Also Oxalate Ba, see also Carbonate, pyridin Comb also the Oxalates,
Try Selenyl Sulphates of metals for phone & Engy also Benzoates,

Lorenzo's tool.

I = Try a $BaCO_3$ with KOH glycerine Sol – ditto KOH alcohol Sol
ditto, Hydroxylamine, Ditto Borax

Oxalate Barium – white powder
" Bi " amorp
" Cd – " " "
Cerium "
Co Powered powder
Cu " powder
Thorium
Pb white precip
Hg per " white
" white amorp
Ni powder or Cake
Strontium white powder
Zn "

Try Cad Bi carbonate in Nitric Acid (Ether Sol) Nitric Acid (Ether Sol)

Oxides Mg
Antimony Tin
Bi
Sb
Cr
Ni
Co
Fe
W.
Ur
Cr
Cd
Th, Zr, Ruth
Cerium like CeO_2 –

Mg cylinder pulverized –
Al " "
Zn " "
Light pressure – Bing
Horn, Rouchale –
glue –
Best thermo alloy?
Iodide Cadmium
Iodic like –
Pure Thick
Sulphide Zn

Hydrogels – precipitates –

Iodide Bi Cu Co

Leather Sulphone

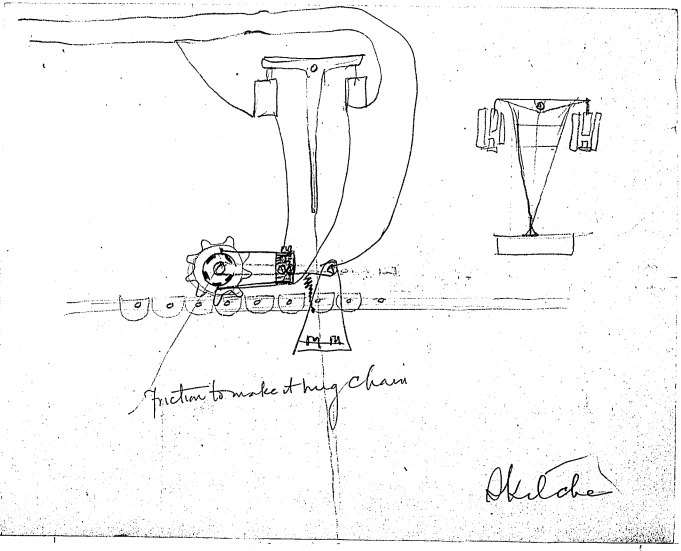
Carbonate – Cd white ppt
" Ce "
Pb – pound lead amorp
precipt CO_2 & H_2O in Sulphate
Mg – use Mg peroxide, Sugar –
Mg Magnesia Alba is very light powder yet thick –
Mn – amorp –
Sr – powder smooth to touch
Zn

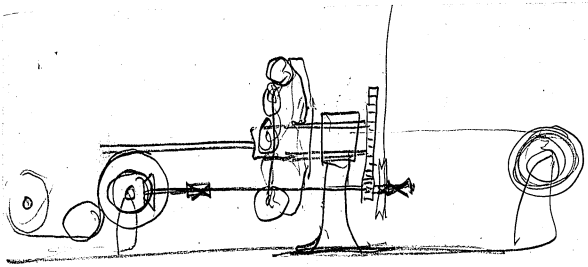
Try Bi carbonate for Bismuth & platinum

All the fluorides,

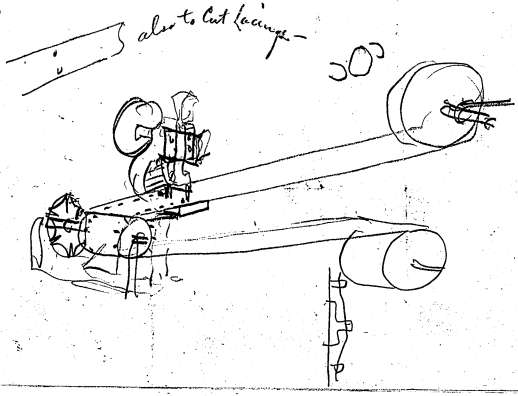
Miscellaneous
Sodium Ethylate
Iodide of lead
" Copper
Calomel nearly insoluble fine powder
Mercurous Iodide powder
Mercuro mercuric Iodide powder
Mercuric Iodide Powder dry form in by pressure
Hg hydrate, yellowish –
chemical agg
Cyanides – Co precip
Ag
Zn

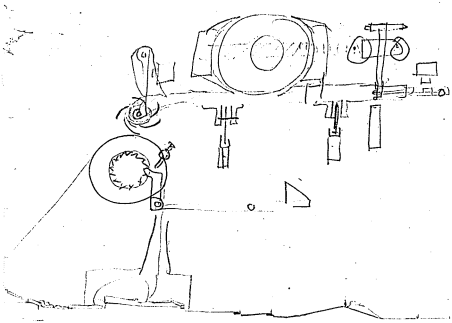
Ferrocyanides,
Ferrocy Co – precip
Bi "
Mn
Zn

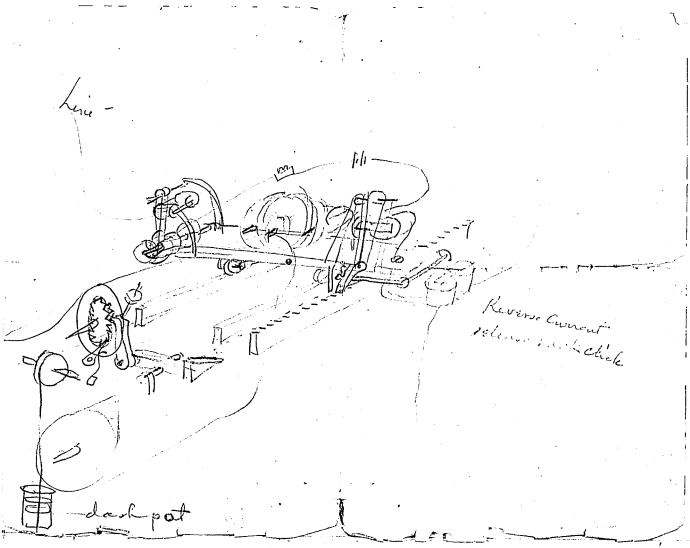

Friction to make it hug chain

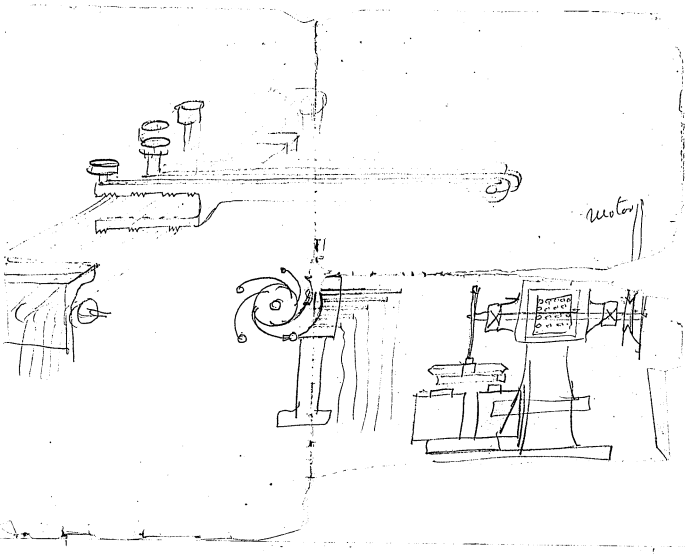


Covering rope with the Marlin






Reverse Current
dash pot


motor

Acetolactic acid Ba salt, a gum
Cu salt amorphous gum —

See Tannates Urates Albuminates

Nil Mg des. alcohol on cooling from boiling Sol deposits a
cliff like Manganin —

file sketches

Tungstates

Tungstates of Barium – Strontium Calcium,
Aluminum – Zinc Lead Mercury
Cobalt Copper Tin Chromium –
Iron Manganese, Nickel, Magnesium

Molybdates

Aluminum Barium Chromium Calcium
Zinc Lead Mercury Cadmium Cobalt
Copper Tin Chromium. Iron
Manganese, Nickel, Magnesium

Phonograph

Acid Tungstates Aluminum – Mercurous Lumps
Oleate Chromium Amorphous
" Copper, Cobalt Lead
Magnesium Mercuric & Mercurous Nickel
Potassium Sodium Zinc Calcium
Strontium Barium, Calcium ~~Cop~~ Iron Tin
Manganese Aluminum Magnesium

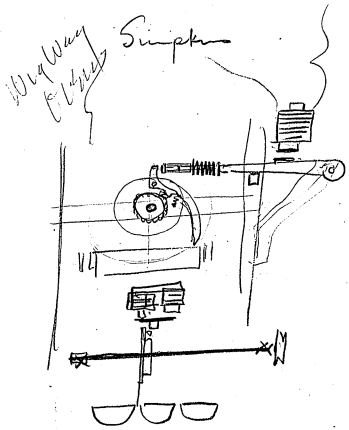
Chromate

Chromate of Barium, Lead ~~Bismuth~~
Mercurous, Cobalt Manganese
Strontium, Calcium, Zinc

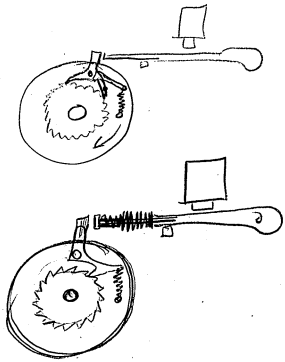
Borates

Barium Calcium Strontium,

Phenol,
Chromate Iron, resinous
Lactate Ammonium Bromide neutral salt
Chromium uncrystallizable — Ferric Lactate Mangf
Magnesium and Hg
Na Lactate Dibasic Citrate hard mass


Wayway
Simpkins

W. & W. Simpkins



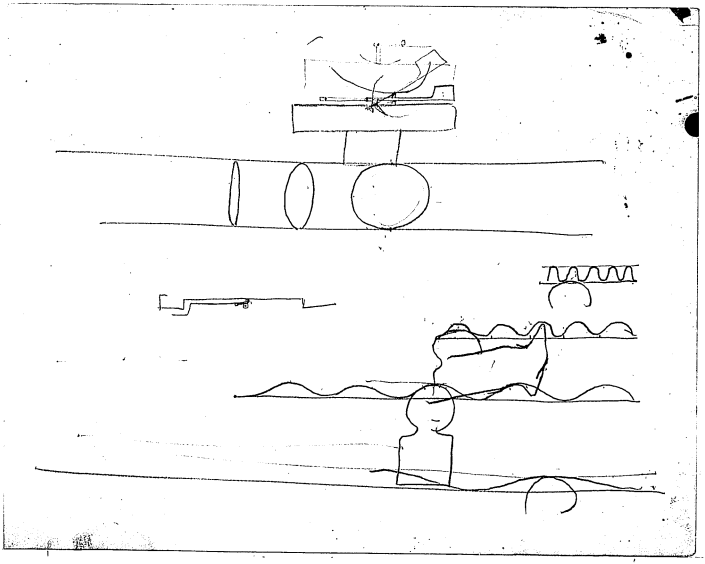
Magnetite Pottery 1
Iron pyrites 1
Monosulphide Nickel —
gold —

Try 2 Milligrs Mullipie also arrow
see which only affects Indian Rubber

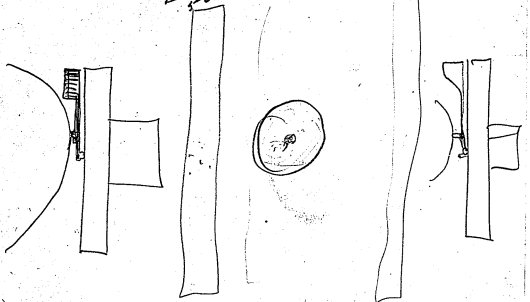
Get good chalk then put in tin foil, + see how long
Keeps without remoisten

Dilute the KOH glycerine 1/2 + try it
think twas too thick —
Try Cubonate Soda, Try pyridin also
Ammonia in Water
Try the paper Cylinder again
See if one Emg will lack to the other without
Current —
Tellurium from or pound or Emg

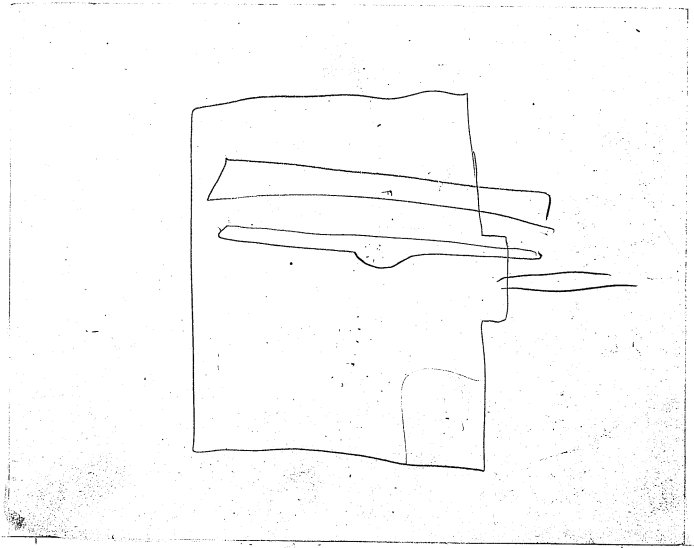
[ON BACK OF PRECEDING PAGE]



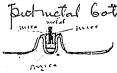
50
10000
33000) 500000 (15.7.
330000
170000
165000
5000

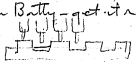


6 –



No 1 Put metal bottom in Batty - get it ^





No 2 Find Dinnouy Recorder & Repeater

3 Position Oil House -

4 See How Shows Liquids progressing - also guide at end

4 Show Hettington Clinker from Shock

5 Test Lamps Thermometer

6 put 100 lbs 200 mesh or finer Enamel flour mixed with 50 mesh Edison Concentrate & bring to yellow to brick it =

7 Clean up desk

8 Write to Phila man about Lilahfield Conn Nickel —

1 Gilmore ~~[illegible]~~ Wed factory — also how deep Yoe G well flow 56
2 Coal ~~[illegible]~~ ~~[illegible]~~ Lake W.O only cut out — changed
3 Mallory about 2 ~~[illegible]~~ ~~[illegible]~~ Natural arch — ~~[illegible]~~
4 Price Wm — water 100 gal large Commun —
5 Gilmore find out if any wells bored in Valley —
6 = Scale ~~[illegible]~~ Specif —
~~[illegible]~~
7 test the small grid Fe for amalgam —
8 Mallory Attn about Steel Bundle and
9 ~~[illegible]~~ Hunter sketch out building 50 @ 200 shed
10 Hunter figure out Oxalate furnace —
11 Mallory find out prime mulleen proclorulfate 9m —
Oxalic acid, ditto blue Vitrol, Nightwrite Ti Extr
Drugget Curtin —
12 - Butley 6 ox
13 Shed for Chlor cutting —

Skeda

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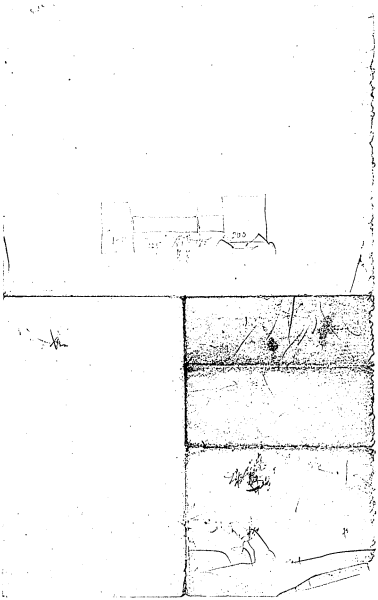


When ferrous Sul is precip at boiling heat
by Na Carbonate with addition of Hypo Na
& dried at 100° it Fe_2O_3 H_2O —
(colloidal, gelatinous)
if in Cold Fe_2O_3 $2H_2O$ — The 1st is pably the
one got by FeS process

The precip obtained at boiling heat
Exhibits peculiar change of color when
ignited at red they leave Brown ferric
at higher brick red & at white ocher-yellow
& gradually violet, yet all have same
specific grav

Anoxide of above character cannot be
prepared from a ferric salt in wet way
But may be obtained by adding
Basic ferric sulfate to fused KOH
& lixiviating fused mass, but has
formula $3\ Fe_2O_3\ 5\ H_2O$ but by
Continued fusion in KOH, less H_2O

Potassium Iron Sulphide $K_2Fe_2S_4$ purple brown flexible needles permanent in air, but heated in closed vessels but oxidized to ferric oxide + K Sulphate when heated in contact with air

fusing 1 pt Fe, 6 pts K or Na Carb + 6 pts Sulphur + triturating —

Try the KOH FeS fused stuff heated in air without H_2O —

See 2nd Supp 687 Ferrous Ox anhydrous obtained by action of CO_2 on iron at red heat. $Fe + CO_2 = CO + FeO$ oxide thus obtained is black crystalline & magnetic & agrees exactly with the formula of Fe_2O heated in air it goes to Fe_3O_4 —

Jacquelier Compt Rendus lxxiv 531

Fuse Sulphide Ni in KOH + water at Dame des Fs —

Fluoride Calcium pretty good
Phenomenon wet it at 1st KOH
loud + good, kept wetting KOH
got louder, then wet with
water got louder again
going weak another one
only with water wetting
polishes — smooth not
so good as Tungstate
but must be Exposed
with $BaCO_3$ $CaFl$ + WO_3
are the most successful
ones, with WO_3 ahead —
Every Count

to test Roth for heavy Metals
Supersaturate with acetic & test
with H_2S & NH_4 Sulfide —

Solutions of ferrous salts heated to 130 @ 140 C
in sealed tubes with Hyposulphite Na
decomposed completely giving FeS which does
not oxidize in air nor attacked by dilute sulph acid
or strong HCl.

Strongly ignited ferric oxide heated to redness
in excess Sodium Hyposulphite yields
Black sulfide iron sol in HCl.

Matthiessen says all iron reduced by H.
with present precautions gives traces NH3
when diss in HCl —

CP Iron by heating Nitride Iron below MPt of Lead
it cuts like lead & oxidizes easily

Nitride Fe Sublimed Ferrous Chloride
absorbs NH gas at ord temp This
when heated nearly to redness
gives Nitride — gray powder
Dmpt 522 MPsup 752

Reduce some flake specular + then oxidize it to Scale Oxide

Make so Ferrous O anhydrous — by drying precipitated + transforming quickly to tube + passing Hydrogen or Boy in dark over hydrogen + use phos anhydride

Find Burns sample of nickel picked from New Hamp + have chemist assay for nickel

Make some peroxide lead by nit acid wash + dry + then use 20% KOH + dissolve all lead out peroxide testing liquid by HS — until it dissolves no more — wash with boiling water

Start + make a lot of N_2O_3 with Ca Hypo + grid litre out OR so can get a quantity to test for impurities after drying — Dekelchen

Protoxide Lead dissolved out Peroxide by very dilute acetate lead
Nitric acid also does out proto = Nitrate by dilute
Perox can be made by passing Chlorine —

Perox made by acting on dead Hydroxide suspended in water by Chloride HCl is formed but Perox pb is made in acids —

Muspratt says best method prepare pure perox lead is by mixing a hot solution of Lead Chloride with a solution of Bleaching powder

Strong Solution Nit Lead gives by Electrolysis Crystalline peroxide —

I think nothing but Fe can be used going to metallic state on account local action but instead of having FeO Combine with Fe_2O_3 – the latter acted as substituent by a more acid sesquioxide & the heat of Combn would raise the value for malleable

Cr_2O_3 – Al_2O_3 Mn_2O_3 & U_2O_3 Sb_2O_3

Uranium magnet decomp H_2O. it forms $UrO\ Ur_2O_3$ analogous to magnetite –

1 = The HCl solution of magnetic oxide should be poured into the ammonia and not the NH_3 into the solution as NH_3 precipitates ferric first —

2. There are 2 other Iron Compounds $4FeO$ to $1Fe_2O_3$
6 " " "

3 Chromic Iron $FeO\ Cr_2O_3$ analogous to Magnetite.

4 Anhydrous ferric ox may be obtained by heating pure Fe in Carbonic Anhydride —

5 — Ferric hydroxide is dehydrated by heating to boiling

6 Ferric ox Fe_2O_3 is a feeble acid & combines with powerful bases (10) FeO CaO etc —

7 Chromium forms a sesquioxide & a Chromic ox Mn also Cerium dito —

8 Ferrous hydroxide like Cupric hydroxide is dehydrated by boiling in a vessel from which oxygen is excluded —

9 — Cerium oxide to higher ox's with facility

~~Chrom~~

Sulphate Chromium precip by KOH containing ZnO
Combines with the Zn ox precip – also alkali oxide
Can these react in alkali & held of Cr Ox is raised
up & down by Electrolysis

If ferric is an acid perhaps can form $MnO_2 Fe_2O_3$
& in alkali reduce the MnO to Mn & it will
then oxidize MnO & instead of going higher
Combine with the Fe_2O_3 – + O_2 mod in alkali –

Possibly Cr_2O_3 & FeO would be better than
FeO Fe_2O_3 as the action would be stronger &
would get a higher Valence like lead but &
Sulphate.

or $FeO.Mn_2O_3$ –

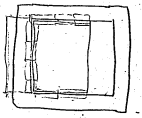
Possibly $MoO\ Fe_2O_3$ or $MoO.\ Cr_2O_3$ or
$WoO.\ Fe_2O_3$ – $FeO\ Cr_2O_3$ or $CeO\ Fe_2O_3$
$FeO\ Mn_2O_3$? ? $UrO.\ Fe_2O_3$ or $UrO.\ Cr_2O_3$
or $UrO.\ Mn_2O_3$ – or $UrO.\ Mo_2O_3$
$FeO,\ Al_2O_3$? maybe good –
$MnO.\ Mn_2O_3$ – MnO is pumpkin brown, its Combination with
Mn_2O_3 to form Red oxide of Mn as a salt
+ sulphuric ox –

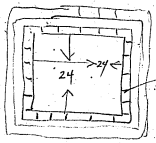
All Analyses
higher the best
Very good results

file Sketches

Bucking furnace

Silicate of Iron Binder

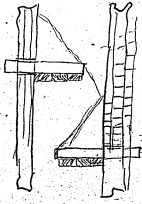




Inside 24 X 24

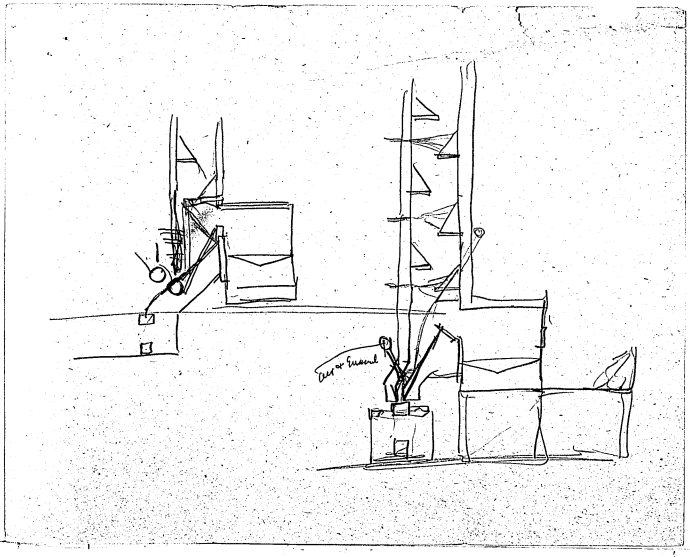
inner - fire brick
2 outer - fire plenum
- brick - Wall 12"
1 brick -

Portland Cement used
Entirely =



2" slab fire brick

Fig 8


Exit funnel

grind antimony Chl Iron with Caustic Lime —
also sulphate Iron —

also try grinding Chl Ni also sulphate with Caustic Lime

see if can peroxidize the antimony ~~Ox~~ Ni by Peroxide Sodium grinding together, also by putting in Hypochlorite,
~~or Oxygen~~

see if can Dehydrate Ni Hydrate by boiling in pure glycerine —

See if graphite Coin be metalized
see if to a boiling solution of Sulphate Nickel Zinc powder will precipitate the Ni as a metal —

Try grid with Cobalt Hydrate,
instead of 8 Ni & 2 graphite in little grids use 7 & 3 perhaps lessened graphite was cause of failure grids to work but I think not, but if it was then try 4 graf —

Try 8 Ni 2 graphite and 1 filament of asbestos wrapped through stuff —

Mallory get some of that steel wool —
Reduce ~~oxide~~ Fe from the Nickel pitch & pack this in grid with 3 graphite —
If the 1 '/16 Ni Lead work in many rows one open [illegible] rather than rip top of open

Solution of Hypochlorous acid oxidizes from
phenyl-quinolyl-ketone chloride, Hans Chelmicki
makes some —

It is said that Ni Hydroxide can be
obtained Crystalized by decomposing
the Solution of Nickel Carbonyl
in ammonia by Ebullition
make —

Nickelous Hydrox forms Double Compounds
with nearly all the alkali Bases
Those with KOH + NaOH are decomposed
by frequent washing along boiling
in water —

Make some Ferrate of Iron + use it
in a 40% KOH, in which it is most
stable — Decomposes in weaker Sol

Manganous Chromate can be raised
to Manganic Chromate of Electrolytic O
Watts Chromates make & try thinks
not sol in Alkali

Nitrate Ni with 20% Solna acid
+ pp by KOH, quickly cohide
otherwise at flat — Excess acid
prevents KOH combining with
H_2O —

to get pure peroxsulfate, bring
syrupy soln of Manganese Nitrate
to 160 fahr — Then dont
combine with KOH but run on
reduction in KOH but in NH_4Cl
+ Zn it will be ok by both

There is a perox Mn_5O —
Hydrated Manganeseo Manganate,
made by acting on acetate Mn
with chlorine for a limited time
$MnO, 5 MnO_2 = Mn_6O_{11}$
this ox heated in current air abs
ox stable at 140 C —

1. Asbestos soaked in silver, dilute Cop., dilute Ni, dilute Plat, reduced by H.
2. also thin paper + burnt out + reduced by H
3. use of organic alkali - ~~Alk of amm~~ alcoholic amines —
4. manganese grid + Zinc oxide in alcoholic amine solution in which Zinc insol —
5. graphite + Copper oxide by treating precipitated hydrate or finely divided CuO by Hypo —
6. Nickel, Silver, Copper plated graphite
7. purified graphite, fused + treated with acids or HCl —
8. KOH, fuse Carb — or acid and oxide —
9. Molybdenum on grid ~~with Ni~~ —
10. amalgamated Copper scale on graphite — Lehmann —
11. speak of putting all grids ammoniacal silver solution —
12. Reducing oxide Ni by Hydroquin
13. Reducing oxide Fe by H to Fe_2O —
14. Reducing " Fe to metal when a needy by Hypo or oxalate + quite —
15. Putting grids + caps for Ni to be made entirely Ni other than Ni plate) —
16. painting grids by members to prevent oxidation —
17. ~~Oxidizing~~ Reducing — presence of Ni oxide or in most gas —
18. Briquette lift pressure + final pressure together —
19. Hydrolyze with Iron
20. " " Copper
21. " " Zinc
22. use of volatile material in grid to give appearance of being valuable before use Campbell, Carb Ni Hydr 56
23. use of oxidized organic depolarizer with Zinc Tartrate — alkali — amines Glycolate etc.
also organic peroxides —

Geldhs

Run some Ni wire thru roll to flatten to 1/8 thousandth or less pitch with No 0
see if can form Ni scale like Copper
Form heavy scale on inch by 2, then put on battery + peroxide it – Cover
see if Ni scale can be peroxided by Hypochlorite. –
Form Ni_2O_3 on Ni plate from acetate, if it works, use hot flattened wire
+ deposit peroxide on it + pack in $\frac{1}{16}$ grid –
see how thick peroxide Ni can be deposited –
Freddy pack a cyanide K[illegible]
Make one more KOH hot – Give acetate Ni –
Wash the reduced Ni or act on with acid + tell free Zinc pack grid –
Have Ni sent to Bloomfield –
Insert some graphite ~~with [illegible]~~ with ~~other~~ Hypochlorite hot
+ pack grid –
pack grid with much finer graphite –
" " without graphite –
" " Dry then treat grid with Hypochlorite for 3 or 4 hours
+ then put in + oxidize by act =

Try oxidizing iron with Blacksmith scale or with Hypochlorite to Na
plate some of the $1\frac{1}{2}$ thousandth brass with Ni + ~~[illegible]~~
then cut in strips + eat off –

Freddy makes a mix for weight to pack a $\frac{1}{16}$ grid using finer
phase, then slightly dampen + press it 1/16 in moved by pressure +
insert in grid – get weight when 1/16 thick –

also take some of the FeO_x from oxidizing FeS + add
little KOH + mixed it 1/16 thick + put on grid – not
some graphite (fine) with it also + without

also see if can make wire rough by pressure
+ then broken up 1/16 size

Acid Calcium Silicate
" Magnesium " gelatinous

Watts 3rd Sup 1019

Sulphite Calcium dis in
Sul acid 10 times wt of $CaSO_4$
dis — The salt thus
~~formed~~ melts at 220
to a pretty magma

Hypo sulphite soda warm dis
gypsum form Sodio-Calcic
Hypo sulphite — in briquette
heat goes to gypsum

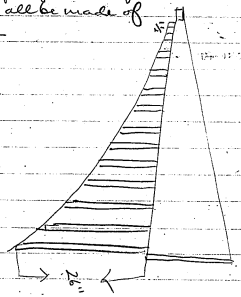
Hypo sulphite Calcium
Very Easily Soluble also on
~~heating and decomposition to gypsum~~
& free Sulphur

Sucharate lime
Resinate Soda
Calcium
Magnesia

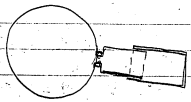
Sulphite Aluminum in which
is dissolved Alumina — tri hydrate
gummy Sticky salt see Watts
also formic acid salt

Page 1

These recorders are screwed into the funnel all in a row or may be staggered around — They are made so each can be made twice the length by pulling out telescope end — the hole from funnel to funnel should be about 3/8 dia — Can all be made of heavy tin —



Funnel about 30 inch long heavy tin or iron only 1/32 or 1/16



Details

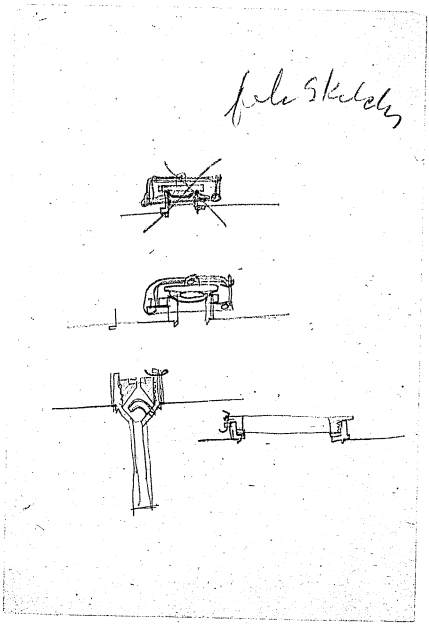
1= ~~order bill wind [illegible]~~
2= ~~see for [illegible]~~ — Mailing Club about another Roll 3 H
3= ~~Note — How gets [illegible] Chemicals etc~~ —
4 ~~— Bicycle [illegible]~~ —
5 Young Old labels Hilting bottles —
6 ~~Hayes about Sh [illegible]~~
7 ~~Hayes about Injector — [illegible] take [illegible] Club~~ —
8 Cal about air reservoir for little compressor
9 = Silencer — block glass —
10 ~~Mailing [illegible]~~
11 ~~Letter [illegible] Spring Model~~
12 ~~Hayes [illegible] Oil Setting~~
13 = Hayes about saving or grinding slots bottom glass
14 ~~" " [illegible] slots [illegible] for [illegible] Rolls~~
15 Daly pressing slots + gloss to secure it when shot —
16 = ~~White — Belching proof~~ — Illuminated field etc —
17 Frame closet in Lab at House
18 = ~~Hayes [illegible] Filling bottles with H2O2~~ —
19 = ~~see Mailing about Steel Co drawings~~ —
20 ~~See if Hobbs sent final drawings~~ —
21 Gulliver Hobbs sent financial Sheet 1 & 2 C
Showing debt to me — stuff sold etc —
22 = If Gulliver sent Hilton time to [illegible]
23 - Bulmalen progress —
24 - If got small blower for use in test Room Carnot Wks
25 = Refine progress — + trying Fauvel Gallery
26 = Where Smokers are — to report + make it up — [illegible] before going further
27 = Violette dark room lot in Light —
28 = Days about Nickel Sep patents — + taking out new patent in US + Canada missing Connes stuff etc —
29 = patent turbine automobile —
30

Alloys for soldering

Use Cadmium as a base + alloy increasing portions of following

Bismuth
Antimony
Zinc –

Also with Bi + Sn as an alloy in various proportions + use this alloy with Cadmium –



flesh tints

Boil Kermes Mag — ditto ~~alumina~~, Sesquichloride Iron
ditto alumina, Nickel with 20% ROH acc of
Salicylic, if not make varnish thus —
Called Soap Varnishes — Boil good very soap
with distilled water till dissolved filter while
hot through cloth — heat again and add an
Equal Volume water and in boiling Solution
of alum as long as a precipitate forms
allow precipitate to settle, draw off the
Water add fresh water stir allow settle,
do this 5 times finally filter through
paper, dry then put in an evaporating
dish & heat on Steam bath till
Consistent finally stir it into
Turpentine nearly boiling until a very
thick Varnish is obtained —

do above with Sulphate Iron instead
alum — also Sulphate Magnesia

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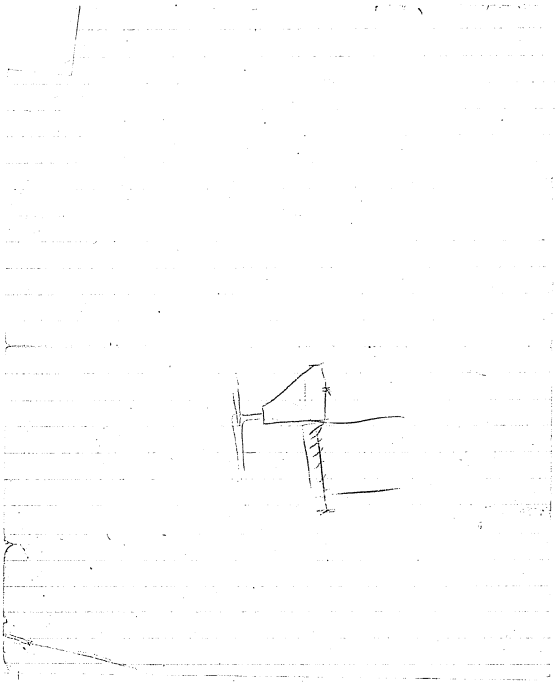


Fole Sketches

To make Black oxide, to boiling solution of Cupric sulphate add Metallic Copper by degrees — will need continued [illegible] of sodium sulphate, boil in water

[illegible] some glycerin, some [illegible]
Chloride, [illegible] [illegible]
some [illegible]

Saturated [illegible] [illegible] by Cop

[illegible] of Silver [illegible]

Solution of Iodine and [illegible] with a
Salt of Silver [illegible] to metallic state

a [illegible]
[illegible] of [illegible]
metallic Silver.

Phosphoric Ether pp. Cu Ag Fe

1 In Pt Crucible melt KOH & put in 200 mesh sulphide Mn — Fole Skiles

2 See if there is any chance of Chromium interfering with ferrous test —

3 Roast some 200 mesh sulphide — idea being afterwards to reduce by H to get concentration —

4 = Magnesium Zn Export boil sulphate Zn with Zn — Mg — al — etc to reduce metals, then precip to get oxide — for KOH sol —

5 Zinc deposited from alkaline sol to which some KCy is added

Emmens has found 0.25% of platinum in Oxide Co Nickel —
They go out in a fortnight or more because Coin with Zinc
Opinion Pt seems not to pass Cyanide
[illegible]

file Sketches

Jude McCallum

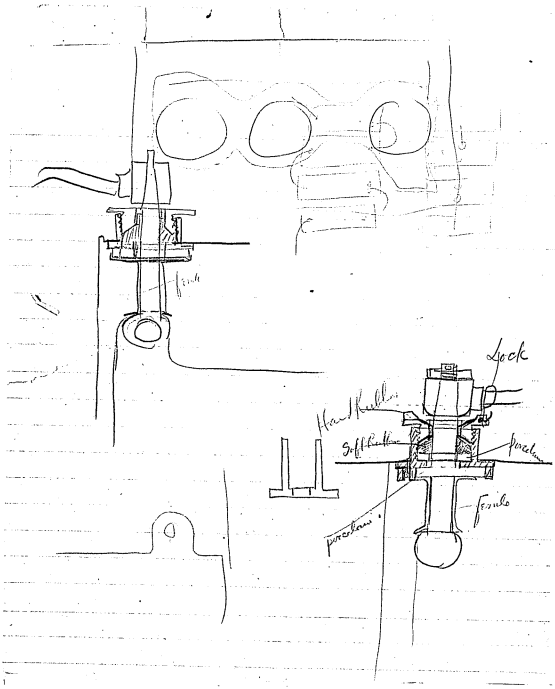
Discharging in 35% ~~of~~ 16 by the Current of a Ni meter
charged gives very little swell —
Moral KOH not cause of swell by being forced in

Soaking new Ni in 35% KOH, very little swell,
Moral not the natural absorption of KOH that
Causes swell,

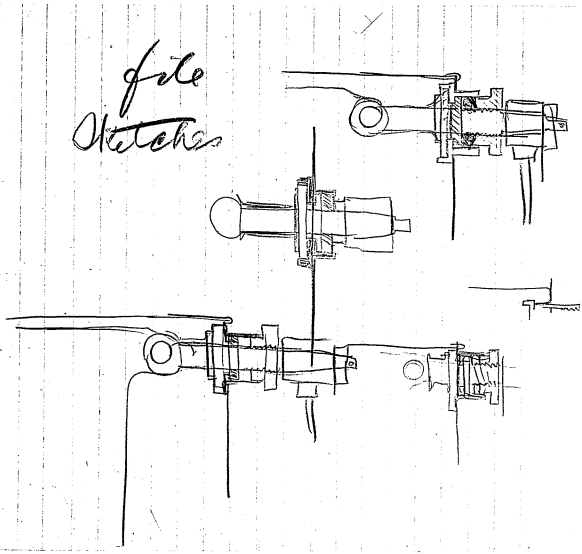
Discharging a charged Nickel only requires a little
KOH, product is Water, water is result of discharge
Moral, One to two grammes of water inside of grid
is cause of swell, it Colloids the dried nickel hydroxide
& cant dry out
Moral No 2 use Ni hydroxide already colloided
by not drying & bring to a solid by dampblack —
or Brodie's amorphous graphite,

Colloiding the ~~dry~~ dried
Hydroxide is Cause of swell, Strong KOH
Helps Colloiding — Colloiding increased area
contact —

KOH doesn't combine with NiO_2H_2 directly
but if NiO_2 H_2O is reduced by nascent
KOH the NiO_2H_2 combines to form
Nickelate of K ~~+ t~~
~~[illegible]~~ hydrated possibly 2 or more
H_2O : 1


Lock
Ferrule
Ferrule

file
Sketches



1901 - Ni 250 weak on
thread 150 or 200 finer
[illegible] mix —

1750 per Pound and only
margin — put 6 mill [illegible]
good view —

Run a Reg 20% 150 rate
discharge 30 minutes weak 5
minutes 250 on test density
Ni unstate Alum [illegible]

Charge 150 discharge 100

chromate Bromate — gas also
Ni deposit — KOH also by
heat, — also metallic —

Try 20% K or Na Chromate mixed with
Sodium — add to the Methylate —
it will count K or Na chloride
find in wood and Unstable
Sodium [illegible] + change [illegible]
into the gases [illegible] acetate [illegible]

Finally make a dip for grid 1/2 the length

also line through 40 on 80 made
Ni — weak mix —

Retto —
Kerr
Wetmore
Hoepfner & Phillips
Wickstrom Bennetts,
Kenyon — wholesup
goes Cam
against ni —

file sketches

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Syndicate 668000
60 to Directors 60000
£608000

£27000 - pref Dividend
27000 to be paid incl + Def,
£9000 pd into Construction Co. 10%
£8000 Treasury

205
30

Cap Subscd 150,000.
1500 shares

I got 205
30
9
244 abt 1/15 Dicks said

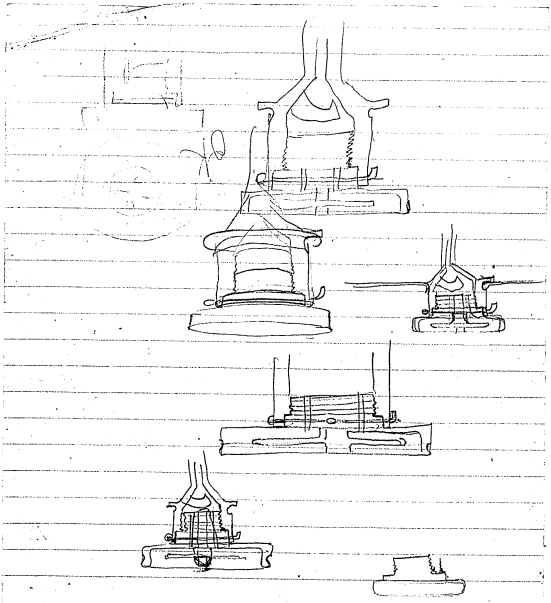
Now Inc Cap Subscd to 200000,
or £50000, my share £7500
I sell shares 3 times par to get 7500 +
then gives me £37500 of new shares —

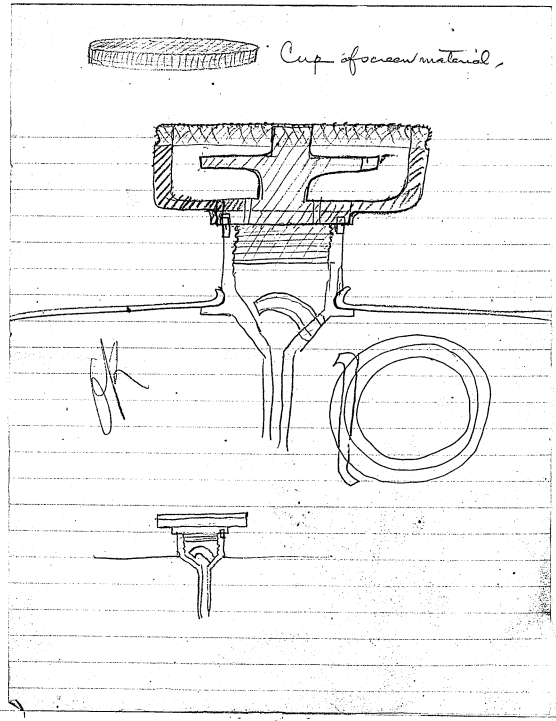
250
15
1250
2500
375
15%

2 | 235
117

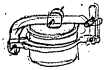
750
15
3750
7500
11250

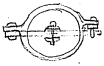
750
16
4500
750
12000
12

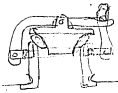



Cup of screen material,

file
Oktoches







Dehydrate Ni_2O_3 275 C — Nitrate on nickel KOH, Ni Vanadate,

Chromate of nickel — Tungstate is in Ammonia Nitr

Vanadate with the Ni [illegible] by Ni_2O_3 — will Ni_2O_3 Nitty Solid

also in KOH — [illegible] — [illegible]

[illegible] without [illegible] of Ni ab pressure [illegible] Chromate Carbonate

[illegible] — etc. [illegible] the [illegible] oxide [illegible] the [illegible] nitrate —

[illegible] 50 hours [illegible] —

[illegible] at low temperature Ni by [illegible] precip from fuse —

[illegible] KOH, with Ni KOH —

also forming a [illegible]

[illegible] Barby [illegible] KOH Ni by H from any [illegible] in H_2O + boil to

rapidly the Ni [illegible] at low temp [illegible] = Nitrate of Nickel Carbonate or double precip and light [illegible] in H_2O

Then boil Ni may Condense with Fe to make a Compound — $Ni_2O_3Fe_2O_3$ or Nickel magnetite or [illegible] —

Hence [illegible] the ignited oxide Ni - ignited very low temp — ~~with [illegible]~~

These nickel compounds to be at low density, [illegible] time —

Formate in nitric decomposes at lower temp than Oxalate.

How about igniting Ni Nitty - perhaps delay low temp + ox [illegible] + [illegible]

Nipolay. acts on [illegible] with chlorine forms like KOH + a base ~~[illegible]~~ in base with Al_2O_3 +

Force oxidizing Ni [illegible] from [illegible] [illegible] work with [illegible] [illegible] [illegible]

powdered to impalpable — 500 passes 743 proof — on ignition impure Ni Salts generally

leave prodigy organic salts leaves metallic nickel — Ni Salts ~~[illegible]~~ precip by Vanadate

NH in excess Nitty — forms $Ni_2O_3V_2O_5$ after fusion —

$5\ Co_2O_3\ 8\ H_2O$

$$\begin{array}{r} 54 \\ 2 \\ \hline 116 \\ 48 \\ \hline 164 \\ 5 \\ \hline 820 \end{array}$$

$$\begin{array}{r} 34 \\ 8 \\ \hline 272 \end{array}$$

File Sketches

Unbound Notes and Drawings (1901)

This folder contains dated notes and drawings from 1901, as well as undated material possibly from the same year. Included are items by Edison regarding surveying devices, phonographs, and storage batteries, many of which contain dates, notations, or contributions by John F. Ott. There are also pages of calculations by an unidentified experimenter.

Approximately 40 percent of the documents have been selected. The material by experimenters other than Edison has not been selected, with the exception of notes by Ott that relate closely to Edison's work.

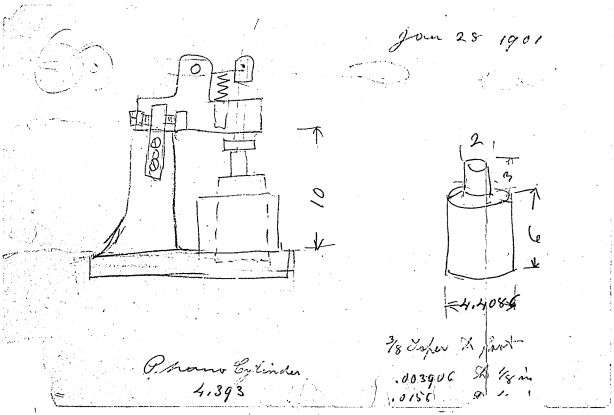
John.

This is the can that we will use
that is the bottom part.

Aylesworth,

Jun 22 1901

The can without the extension


Jan 28 1901
10
2
3
6
4.4088
3/8 Taper Pin part
.003906 Dia 1/8 in
.0156
Phono Cylinder
4.393

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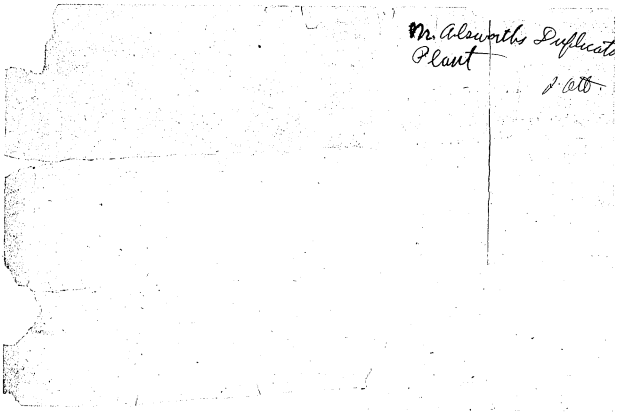


Mould 4 3/4

Cooling Jacket

4 7/8 long

---

4 Cooling Jackets

2 Top Boxes

4 Shrinking

Arbors

Jan 28 1901

No 1099

One cooling tank

Mr Ott

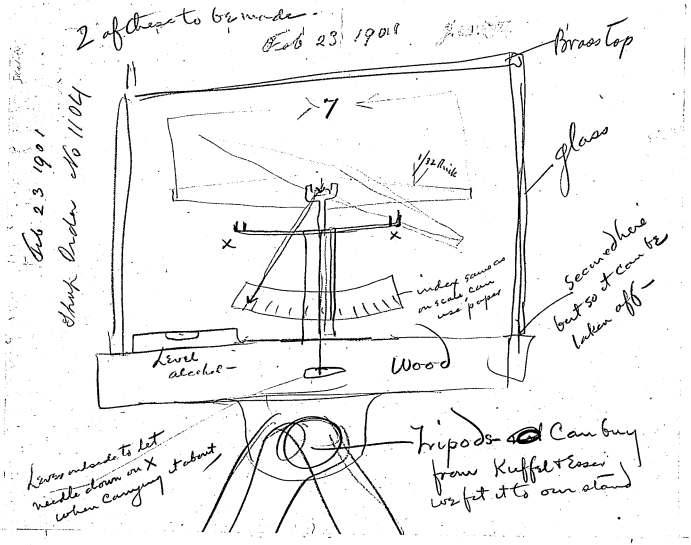
Have you any drawings of Combination shaving Machines?

Delivered to Mr Waterman
Two tracings of Combination shaving off Machine, Also three tracings of Small Shaving off Machine

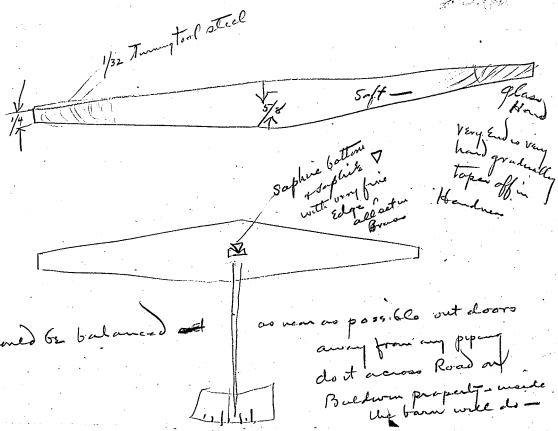
A. P. N.

Feb 12. 1901

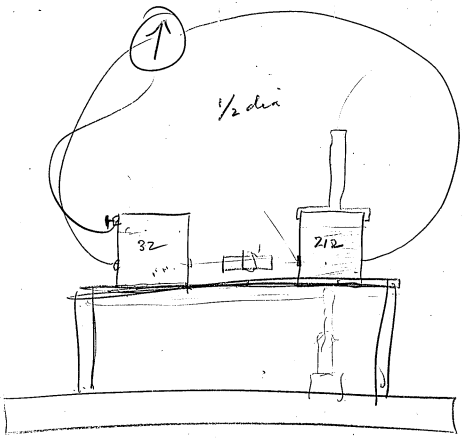
J. E. Ott

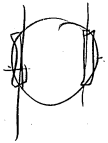

2 of these to be made.
Feb 23 1901
Brass Top
Shop Order No 1104
Feb. 23 1901
7
1/32 Rule
glass
x
x
index same as on scale can use paper
secured here but so it can be taken off
Level alcohol
Wood
Tripods - Can buy from Kuffel & Esser
Lens outside to let needle down on X & about when carrying
Will fit it to our stand

Feb 23 1901


1/32 Thin tool steel
1/4
5/16
Soft —
glass Hard
Very end is very hard gradually tapers off in Hardness
Saphire bottom & graphite with very fine edge & a bit of Brass
should be balanced
as near as possible out doors
away from any pipe
do it across Road on
Buckhorn property - inside
the barn will do —

1901

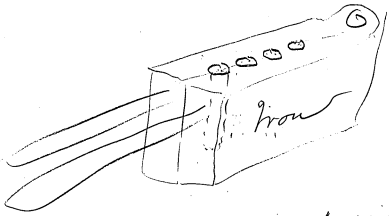




Thermo. Exp.

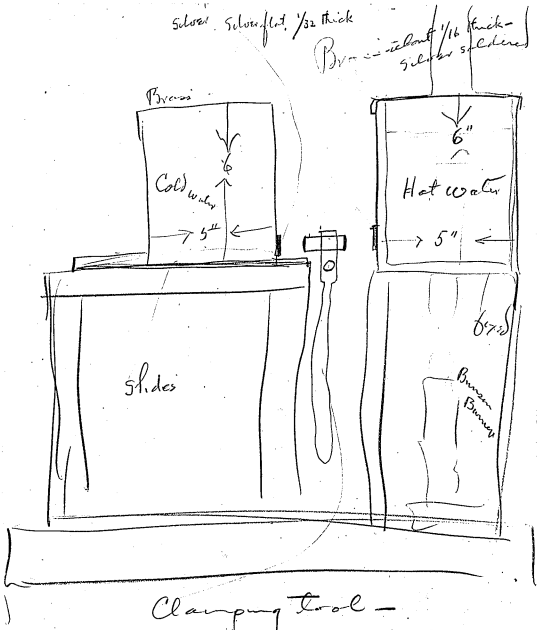
April 5 1901.

4-



4 X One inch

Chicago Ill April 5 1901



Clamping tool —

Shirma Opp April 5 1901

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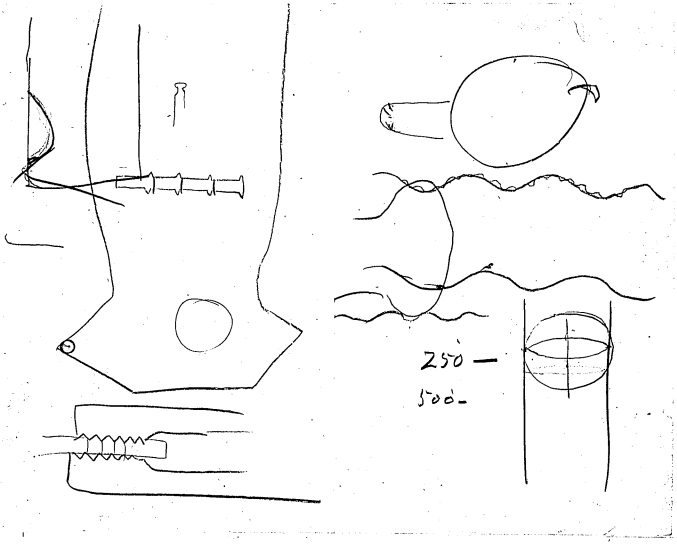
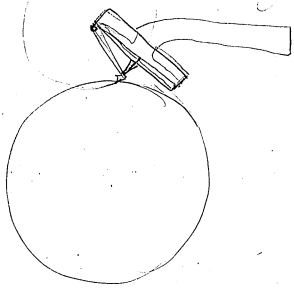


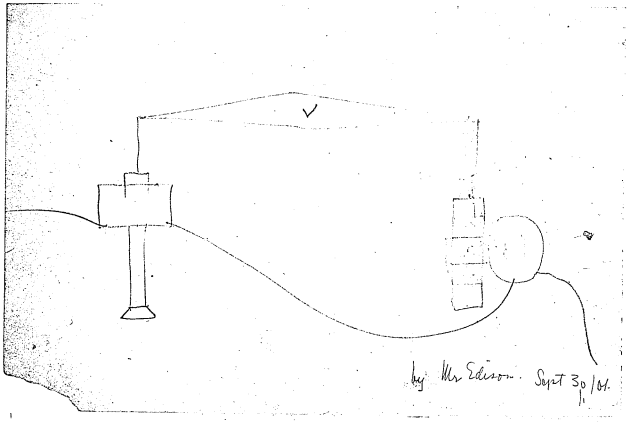
Phons.

Tronicke

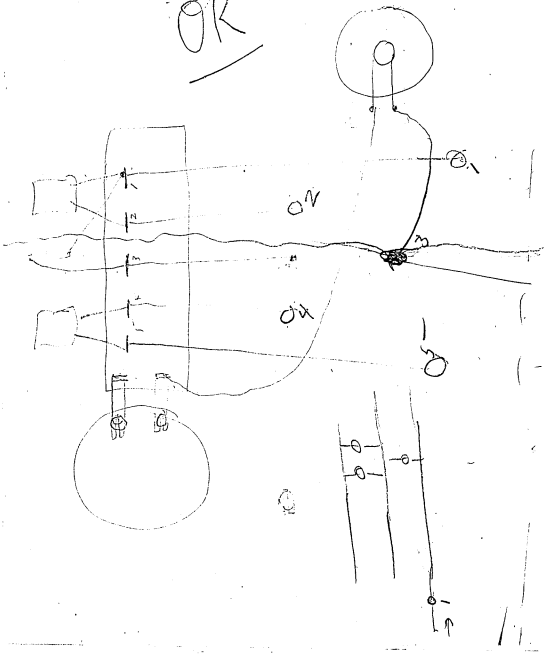
June 13 1921



96
150
480
96
60 | 144 (240
286 | 120
8 | 24
96


by Mr Edison. Sept 30/81.

OK



Winding of
Edison Meter

Armature 24 Div
Turns in each div 200
No 36 B.S. Gauge

Starting Coil 1000
Turns 36 B.S.

Large Wire
14 Turns
28 Turns in opposite direction
14 Turns same as first
Cannot count first and last
in series

Gearing

Motor D run 60 rev per Minut

Worm on Motor Shaft — 10 Pitch Double Thread

Worm Wheel 26 teeth

13 X 1

Friction wheel 1 3/16 in diam

Worm 32 Pitch

Worm wheel do not know

Pinion 20 teeth 120 Pitch

Brass Gear 80 teeth 120 Pitch

J. F. Ell.

Sep 30 1901

Armature 24 Div

Turns in each div 200 No 36 B.S.

Starting Coil

1000 Turns No 36 B.S. Enough wire

Shunt Coils

19 Turns on first layer

28 " on second "

14 " on third

Connect first and second in series

Wind second in opposite direction

to First and Third in series

1 – See Sieg[illegible] about Drawbar[illegible] designs

2 = See Bangman & Simpkins about pulling [illegible] top at Glen Ridge & Wednesday morning

3 = See What Gemmer Clement & Hoskins

4 quote Hamilton the dust trap & samples for [illegible] –

5 = See How, Robertson Jones & proposition

6 See Tremaine about the hose clamps

7 = See John Alt about Vernon & Dupont

8 = Look at Complete cell impression Brown

9 = [illegible] look for if Clement & Hoskins [illegible]

10 See if there is a Water deposit on Engine at Glen Ridge

11 See about Drawing at Glen R – Simpkins – Walker

12 See Skinner [illegible] New new Reports on spelling on

13 " " & Webster about Waters & hoistings

14 " Simpkins what he knows about Bergman order

15 " See Coghlan with

16 " Ross How put on KOH

17 ~~[illegible]~~ New Gen[illegible] Ohio and make flex Compound put Rubber Asphalt & Oxide Magnesia etc for battery

18 See Rambalgh ~~How much money battery to call up & how much spent~~ =

19 = Hector in regards to stuff at Clermont Works ~~Compare for light & Diplomas – pumps & Continuous etc~~

20 = See Simpkins about balance ~~plans for the [illegible] & about Bagging Machines~~ –

21 = See Simpkins about making two gauges [illegible]

22 See Coal House ~~bratty Engin etc~~ –

23 See about wiring pts at [illegible]

24 See Rogers if we got all our tools we ordered

25 = See Walling or Jeffries Co by our Elevator not delivered

26 = See Ohio ~~[illegible] can be put on at Glen Ridge~~

27 = See Hewins ~~[illegible]~~ in regard of debris at Q Ridge
28 = " " " of old [illegible]

29 ~~See Smythe's book [illegible]~~ brass furnace in Long Bldg at Lyon Ridge

30 See S' what he has done about opening Rolls for rolling at Lyon Ridge —

31 = ~~See letter~~ the UOC bldg at Q R cannot be provided ahead —

DKulch

32 ~~Johnson — Hicks boy that worked at Alloys~~

33 ~~See Rafn notes what paper wanted in 22 from P.T~~

34 " about Iron powders & [illegible] aylsworth takes charge of ~~[illegible]~~

35 See Rafn about Curves on Pailer Battery

36 See Bakeline, Dunnard & Herrington about Nickel ore mines

37 = Copy out all the essential points in Riddle's paper for Hyg.

38 = Answer Sudbury letter —

39 ~~Send to Barnes for the Orleans Geological Maps~~

40 Copy out ~~of bellet book~~ all Sudbury notes & what a Nickel slater boy —

41 aylsworth, test the Origan nat (Riddle) nickel sample

42 White magnetic separation ~~[illegible]~~ + partially insoluble — [illegible]

43 — have aylsworth by powered Rutgliffe ore produced to nickel & extracted with magnet —

44 = Test Wallin Millers Cylinder

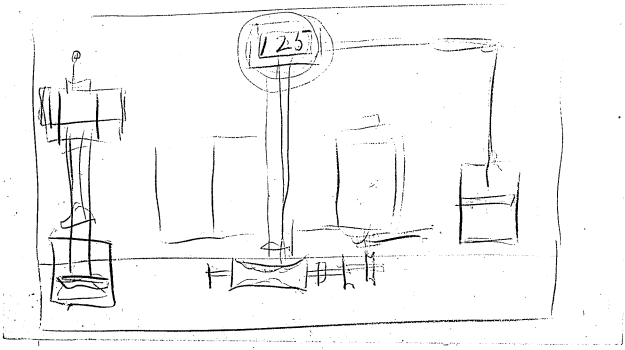
45 ~~Compl[illegible] but Burn[illegible]~~

46 = ~~Sample[illegible] Whether being done at Stewart~~
~~on Chem + Bloom~~ —

48 = ~~What is Condition of old Chem Bldg at Silverd~~
~~has anything been done~~ =

49 = ~~Put[illegible] KOH~~ —

50 ~~Get Sniff other oil Trunk from Co. port~~ —
~~was shown a port British Tank to tank~~ KOH.


1235

15cm

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$$\frac{V_e}{V_m} = \frac{1-\eta^2}{4\eta}$$

$$\frac{0.8}{2.7} = \frac{4}{34}$$

$$1-y^2 = 4\eta\, 0.7$$

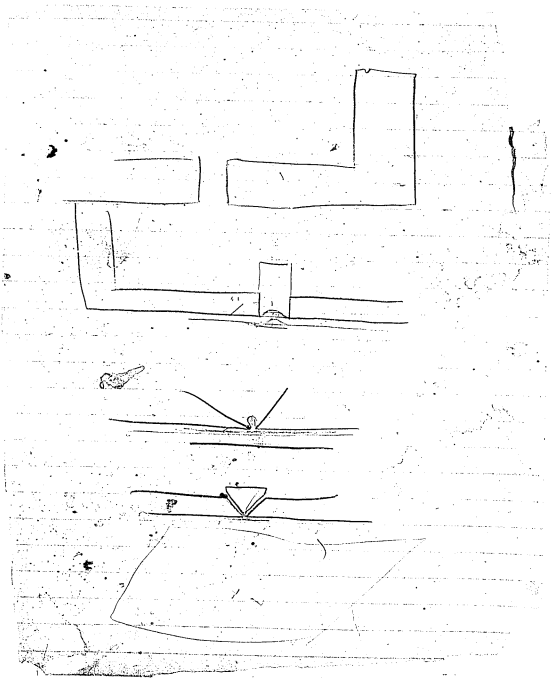
$$\eta^2 + 1.2\,\eta = 1$$

$$\eta = 0.6 \Rightarrow 0.36+1$$

$$y = 0.6 \approx 1.$$

123

1.2.5



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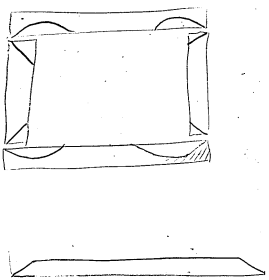

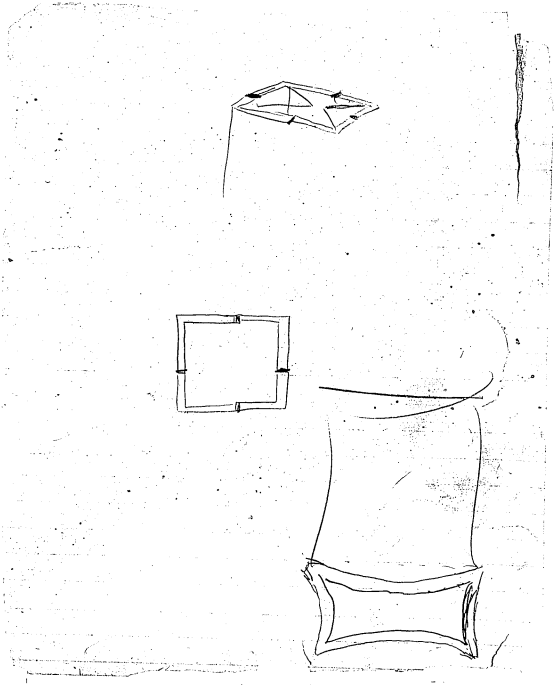

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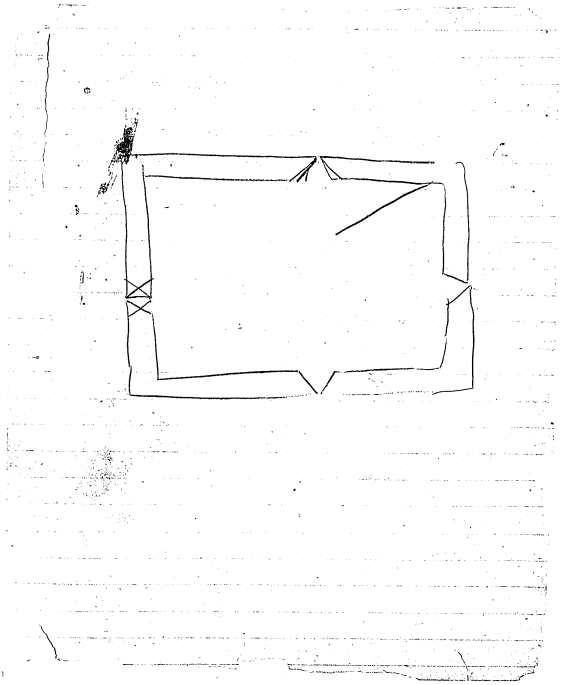

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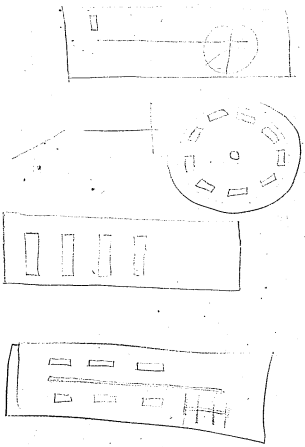

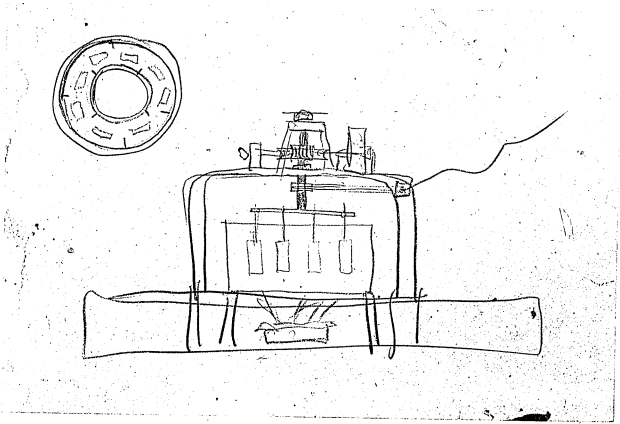

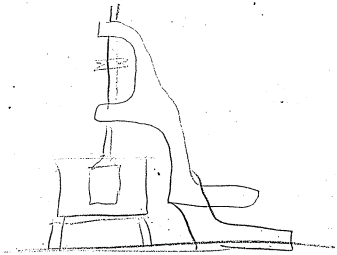

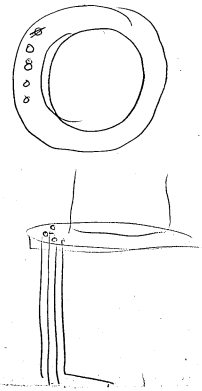

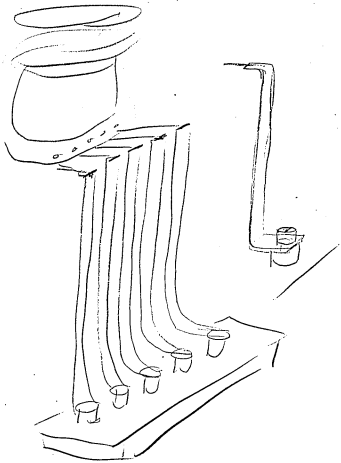

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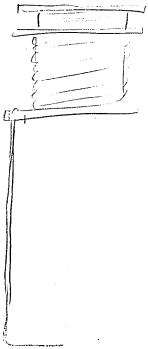
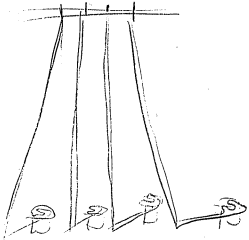
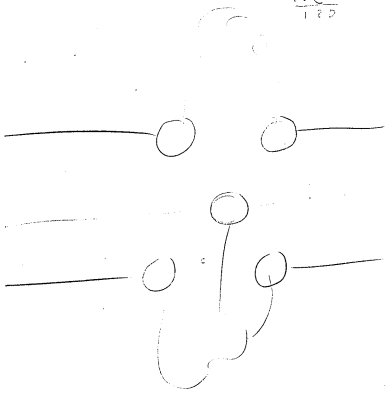
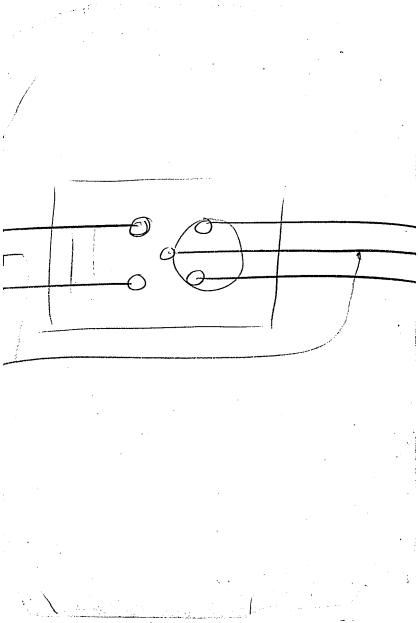


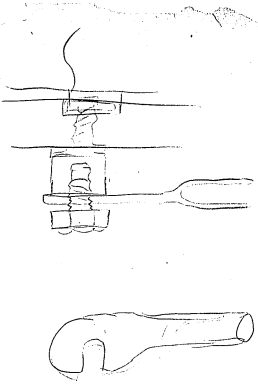


$\frac{120}{126} = 60$

$$\begin{array}{r} 7200 \\ 6720 \\ \hline 480 \\ 222 \\ \hline 180 \end{array} \Big) \begin{array}{r} 126 \\ \hline 57.1 \end{array}$$







Carriage No 29. 44 Watt hours
per 1000 lbs wt to propel 1 mile
at speed 12½ miles per hour

Draw bar pull can be obtained
from Wattage by multiplying
Wattage by .392 – Thus if
Wattage per 1000 lbs of load
of a No 29. of any Car be taken
as 44 draw bar pull per 1000
lbs of load as for the Vehicle
is 44 multiplied by .392
Equals 17.25 lbs Draw bar pull

Relative Draw bar pull
Level asphalt 100
Level macadam 100
Good Belgian Block 100

Very good hard road 1½
fair " " 1½ to 1.32

Snow and Ice

Chemnot = make Ferrate K ditto

ditto Barium —

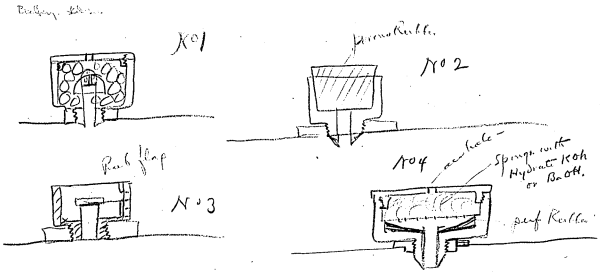
Manganous Hydrate = act on it by Sodium Hypochlorite, &c

Manganese-Sulphide = make higher sulphides when low of Metals which are higher than Zinc or Cr. Mo, Mn Wo
to also add for deleaded — experimentally working manganese
Sulphide

Make Dimolybdosulphide Iron (see atlas. 391 Reg (Iron)

Sulphuretted Molybdosulphide of Iron & Sodium p. 392

act of ferric Hydrate by Na Hypochloride = Mg


No 1
Perm Rubber
No 2
Rub flap
No 3
No 4
Sponge with Hydrate KOH or NaOH.
perf Rubber

1. NH_3 Solution NiO – Try reducing by Mg-Al Zn

2 = Zinc 75 Ni 25 – Electro method got Zinc broken – no loss Soda – Granular Zn got power after use –

3 = oxidize by Hypo some of big lot of Iron + look at Micro – also see if lumps break up if so try one 7 + 3 –

4 Refer make another list non dull red longer time for fresh Experiments –

5 amalgamate ~~test~~ board Contacts KCyl + KCy – or Nitrate Hg –

6 Look up Aylsworth Brown Chillson Mill analysis see Curve

7 = See Ott about some one help Trinks so he can make News Recorder Exploit

8 alloy Copper + Ni + Electroplate method might do ~~Getter~~ Even than Zinc can be plated for 1/16 per lb – but probably Solution would attack nickel –

Sesquioxide Silver by electrolysis, highly sensitive
obtained by electrolysis 10% solution $NaCl$ on
Nitrate of the Ag_2O_3 large black needles metallic
lustre. (Compt. Rend. 90. 653–656)

Absorption of O_X by turpentine which turns
it into Hydrogen peroxide is used in Mfg
Scale – Try Turpentine in Carbon plate

Magnesium Carbe O_X is reduced in alkaline Sol
without dissolving

Rosin O_X stored

Indigo white to Indigo Blue – good

Sulphate Zinc + Sulphite Na. Zn pale + Na pale
Zn dep on one ferroxi on other, Zn
not decomposing Sulf ?
12.9.4 gt

Try solubility of all the Acidic Dyes in KOH, NaOH
$SrOH_2$ + $BaOH_2$ + MgO — also factor change
with hyposulphite or reducing agts

When a plate of Zinc is immersed in a solution of the double Cyanide of Ni & K, Hydrogen is evolved & metallic Nickel is deposited with plate as a blue powder & a cloud deep red color also generated

Which is Sodamide,

act on Ferric Hydrate by Hypochlorite

also Perox. Soda for Ferric peroxide —

Hydrated Peroxide Le Mang dont work

Try pyrrhotite in grid with graphite

Don't fail try magnetite through 200 mesh in grid also — Black hydrate in grid for Selenide

Also oxychloride in afrequian Dontant

Fe grids the one that has all Sulphur out + test with Zn (Selenide)

Pyrophosphates form double soluble salts with
Iron Zinc, Mercurous, Lead + Ag Mercuric + Chromic salts
Insol —

Picric acid produces pp in ammoniacal sol sul Cop

Try Sulphate Cerulein in water deposit on
Ni ~~oxide~~ oxdz ct then use this with Fe to
get v. alts —

Phosphite Cop
Ferric phosphate
neutral pyrophosphates of alkalis have alkaline reaction
Metaphosphate Cop insol alkali
Cerous ferrous orthophos

First Volts Fe + Ni pan 20 30 40 50 + 60% KOH ~~Reply~~
~~Chromates and Salts~~ after cell run down
to 110 Volts on open & then leave on 1st peg
for 10 minutes or so —

freight ferrous orthophos oxidizes in air to
dark blue Ferroso-Ferric phosphate,
Vivianite — (Lilienite)
This has see volts 5.85 Peg Try the Sodium phosphate 364

Peroxide of Ba Sr + Ca usual
make hydrates in Carb plate & place in
Solution peroxhydgn

Iodates of Ba Sr Ca Fe Sl
3 at 0 also I
good

See Watts 2nd Dict 687
abt Ferrichl

10 atoms Fe_2O_3 dissolve in 1 at Ferrichloride &
resultant is sol water if more is added
the oxychl is deposited — use latter in grid

Ferric hydrate is completely dehydrated by bringing
up to 160 @ 200 cent in saturated Sol of
Chloride Ammon or Chl Sodium — Try

Make that usual hydrate descbd p 395 —
possibly there is some as OX from Oxalate
from Sulphide — there is 2 or 3 ways
making it try all —
detto oxychloride last pp 378 watts 4 top pp 379

probably quickest way to determine the phosphates is to use plate of antimony - Tin, Iron, Lead, Copper & make the phosphate on these surfaces in Soln of Meta pyro & Orthophosphate Soda - Hypophosphate & phosphite - Then transfer to a Zinc Bichloride in Soda & take Volts, if any signs make stuff & pack in grid -

o

ammonio Manganous phosphate

Pyrophos Zinc is sol in KOH,

There are basic nitrates of Copper which are insoluble in Potash -

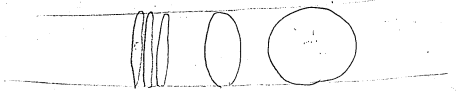
make scales of metal to mix with NiOx instead pbO2 by plating on a plumbago surface & stripping

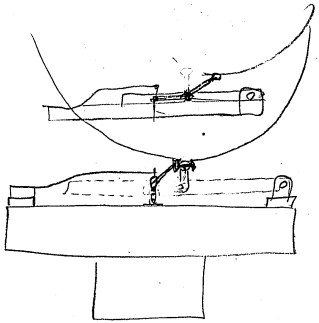
Try Experiment of dotting iron with copper Varnish & plating Ni over it & then put in Sul Cop to Eat holes thro

pack in grid broken CuO pbO2 through 200 mesh 7 pts graphite 3 & ~~best~~ fall Volts &c

powder some MnO2 sulphide & ~~pack in grid~~ put in dish bottom of cell & of by at

Pheno





[ON BACK OF PRECEDING PAGE]

$1,000,000
33 1/3 % Common stock

$3,000,000 Pref 3,000,000
12,000,000 Com Par 2,000,000
Ex. 4,000,000
Pro. 3,000,000

Mix tar with Phosphate Magnesia &
Carbonyx —

ditto Chloride of Ammonia —

ditto Zinc Oxide —

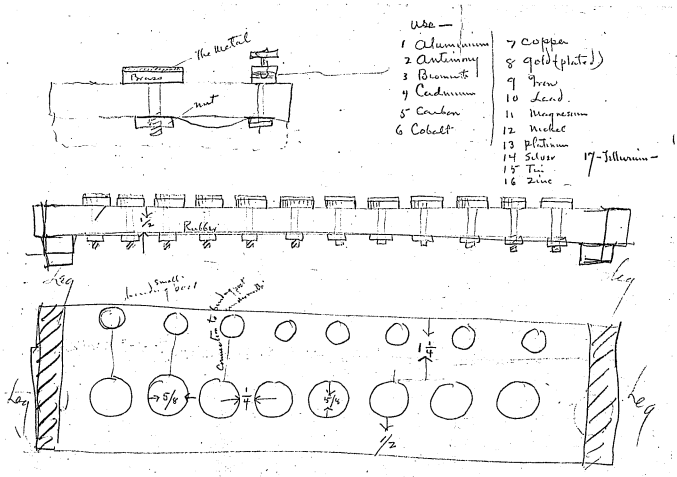
Try some our coal dust with tar &
Phosphate Magnesia — also without Phos Mag —

Try a Carbon plate with Copper opposite of
for Volts do =

Unbound Notes and Drawings (1902)

This folder contains dated notes and drawings from 1902, as well as undated material possibly from the same year. Included are drawings by Edison of experimental apparatus pertaining to x-rays, electromagnetism, and telephony. There are also documents relating to fluorescent lighting, electric meters, phonographs, and an electric furnace. Many of the Edison drawings include dates, notations, or contributions by John F. Ott. Several contain notations indicating their use in the patent interference case, *Edison* v. *Macdonald* (see Legal Department Records, Legal Series), and some bear an archivist's inscriptions.

Approximately 60 percent of the documents have been selected. The items not selected consist primarily of notes by unidentified laboratory employees on automobiles, batteries, and electric meters.



Multiple Metal Strip

[ON BACK OF PRECEDING PAGE]

Drawing finished Feb. 11 1902
J. B. O'H.
Stock Order
1243

Multiple Metal Strip

Model Finished

There is to be a lot of these needs —

of following Metals, one of each — must not be soldered if
but screw together force one into other —

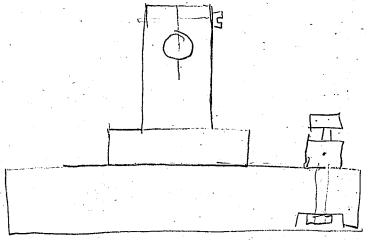
Aluminum	Carbon (arc)	Iron	Zinc —
Antimony	Cobalt	Lead	
Bismuth	Copper	Magnesium	
Cadmium	Brass	Nickel	
		Silver	
		Tin	

[ON BACK OF PRECEDING PAGE]

Drawing furnished Feb 12 1962
Not in order
Feb 12 43
J.F.O.

Bobbin

Model Furnished



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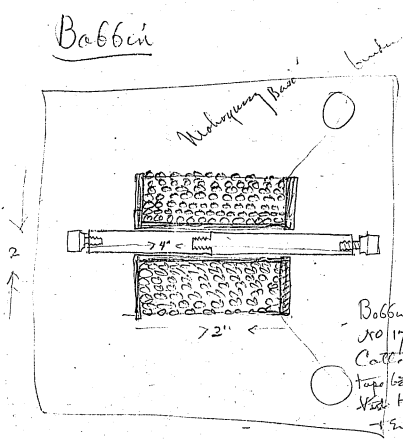
Drawing Finished Feb 12 1902 J.S.C. Shop Order 124

Holder for Chemical Crystals

Model Finished

Bobbin



The removable Core is made of two metals Bottom the Ends have Clamps of same metal,

Bobbin wound with No 17 or 18 double Cotton Copper wire — tape between each layer Use Hard Rubber tube at Ends

fast bobbin down with band —

Long Magnet

(1)

get 300 feet of smooth charcoal iron wire about 1/8 thick or the nearest to that size sold commercially — use Habenhaw rubber tape and tape it from end to end ~~that is~~ go over taping the tape 1/8 inch — after the whole is taped tape it again in the opposite direction with 1/8 inch lap = all except 4 feet of each end = then ~~wind~~ wind a single layer of double cotton covered copper wire from end to end testing it with a needle & compass as it is being wound so there will be no crossing = wind to within 4 feet of each end — use No 20 B&S or near that size = after the wire is wound

[ON BACK OF PRECEDING PAGE]

Drawing Furnished
date 13 1903
Patent Order No 1243
J. E. B.

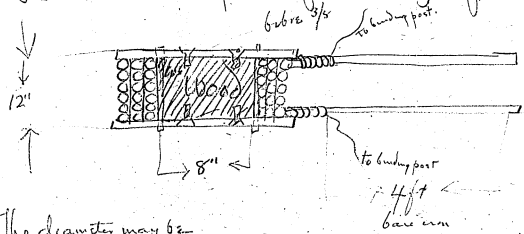
Ring Magnet

Model Furnished
April 18 1902

2

Tape it twice as you did the base now wire —

Then make a spool of Vulcanized fibre —



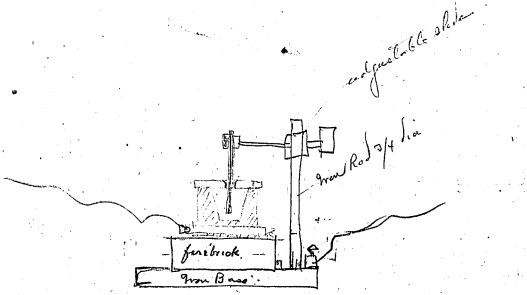
The diameter may be anything to suit so the 300 ft can be wound on ~~[illegible]~~ tape each layer —

But it on a wood base

wire when finished will be 1/4 in diameter

A spool will cove 8 in 4 in wide 2 1/2 in deep will take 300 feet of wire

13 in full diam

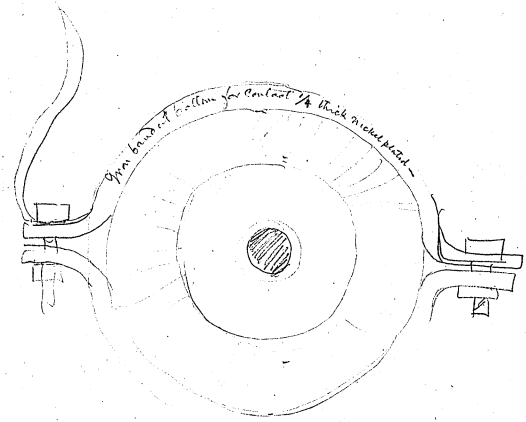

fire brick
Iron Base

[ON BACK OF PRECEDING PAGE]

Drawing furnished
Feb 14, 1902
Shop Order 1243
J.G.O.

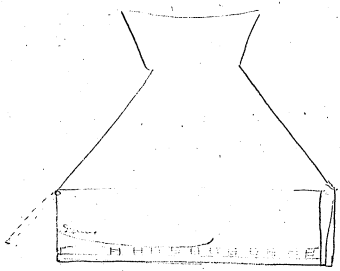
Electric furnace

Model Finished


Iron band of bottom for contact 1/4 thick wrought plate

D
1902
"Fluoroscope"

Fluoroscope & Slides



Fluoroscope — for the new mahogany slides with mica boxes — Dark box made of 1/4 mahogany or rubber — with spring inside to hold the slide in position = The front is open & it is to be closed by shoving in

a frame over which black paper — metals & other substances are fastened, then the slide with crystals are shoved in — the spring lifts at slide is shoved in + holds the opaque plate & slide in position, then the door is closed, there should be gasket on opaque front + door so no light can enter,

The model slide will be given you in few days + you can build of Chromoscope from it to right size — I may want to insert or permit the slide a Dry photograph plate in a frame so the spring should be long + Elastic to take the 3 framed in —

This wants to be well made as there will be several hundred slides to go in & out, & it must be Easy & quick to change them —

The Carpenter is to make 300 slides of which 50 slides are to be put in a box. This will make 6 boxes these boxes should have cleats so Each slide when put in box goes in Easy & dont touch the other slides. The box should have a Cover & handle —

There are I think 40 or 50 places on Each slide for Crystals

4'

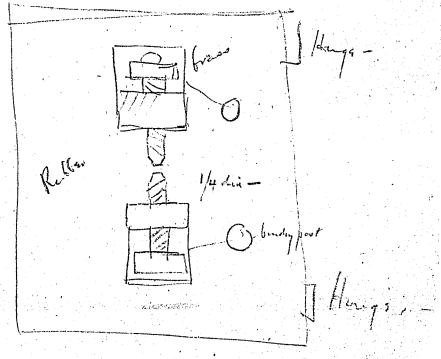
This will give about 14000, different Circuits, two Mica washers are used for each hole, the only Chance Mica & make a punch, also a dieing device to make the wave ring Cheaply—

[ON BACK OF PRECEDING PAGE]

Fluoroscope & Slides

Furnished

Model April 24, 1902


Hinge
Roller
1/4 dia
bending post
Hinge

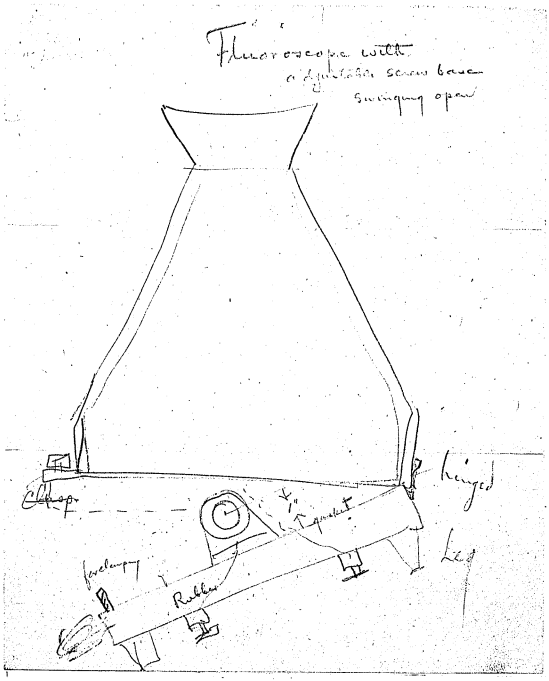
[ON BACK OF PRECEDING PAGE]

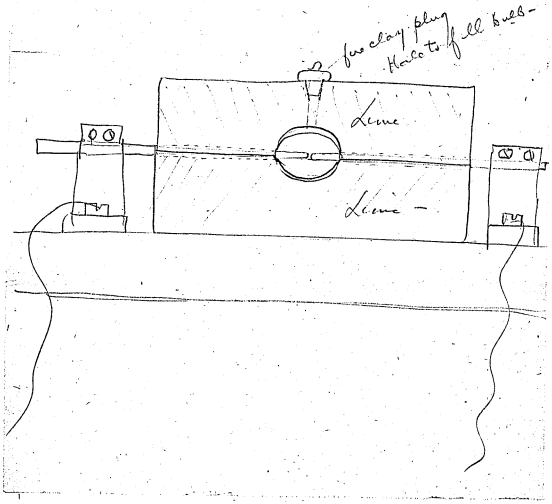
Examiner Denning
Oct 21 1902
Order No
1243

J. G. Gill

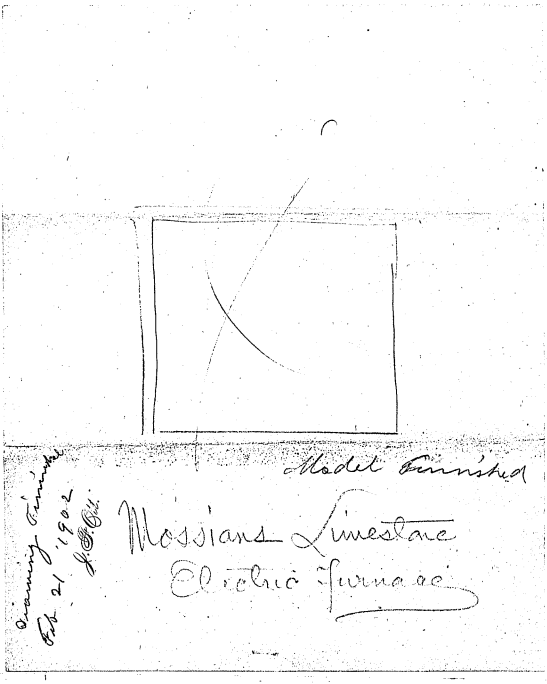
Microscope with screw base

Model Furnished


Fluoroscope with
adjustable screw bar
swinging open
hinged
Clamp
gradient
Leg
footrest
Rubber

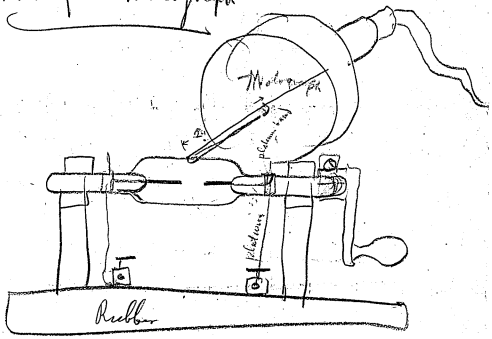

for clay plug
Hole to fill bucks -
Lime
Lime -

[ON BACK OF PRECEDING PAGE]

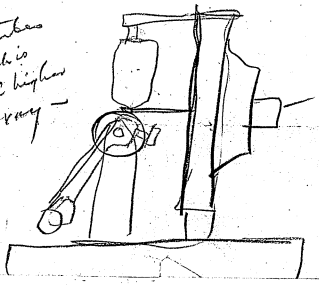


X Ray tube Mutoscope

D
1902 "X-Ray"



1/2 dozen tubes
2 of which is
Exhausted higher
than X ray —



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X Ray Tube Motograph

Model Furnished

Furnished Feb 24 1902

Fanning J.E.C.

D. "West Orange
1902 — Lab.
Order No. 6 — Notes" Feb. 25, 1912

M. John Ott —

Ship to T. A. Edison J.F.M.

Mat. Nickel Exploration

How Ship When

Terms:

		Change dip needles so that good		
		ultimate will be on scale —		
		close holes in case —		
		Change support — or ring.		
		Repair compasses & dip needles		
		as necessary —		
		Make recording device, on		
		for samples if satisfactory,		
		1/12 mode —		
		All to be made of aluminum.		

Jaty

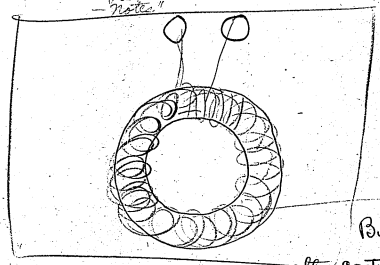
[ON BACK OF PRECEDING PAGE]

Yhes are given out
on contract to
Mr Brunecke for
$12 on each

D
1902

"West Orange -
Lab
Notes"

Bismuth
Induction Coil



Ring Cast of
Bismuth. 3/8 square -
after casting round edges & scrape

with Tape then wind 3 layers
of Silk insulated NO 20 or 22
Copper wire. Secure ring to a
board & have 2 binding posts
for the wire

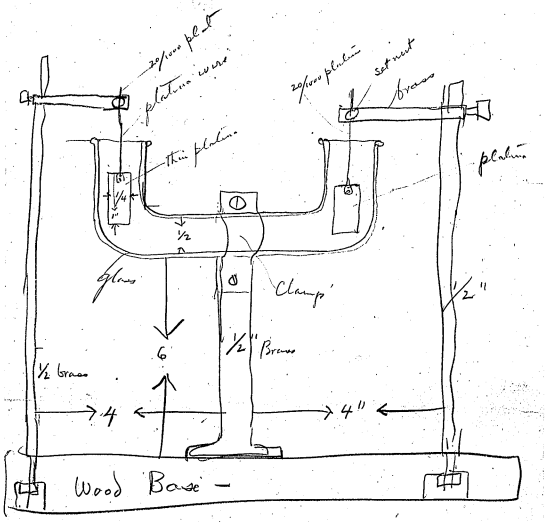
[ON BACK OF PRECEDING PAGE]

Summary for March 5, 1902 J.E.B.

Bismuth Ring

D
1902.

U Cell —

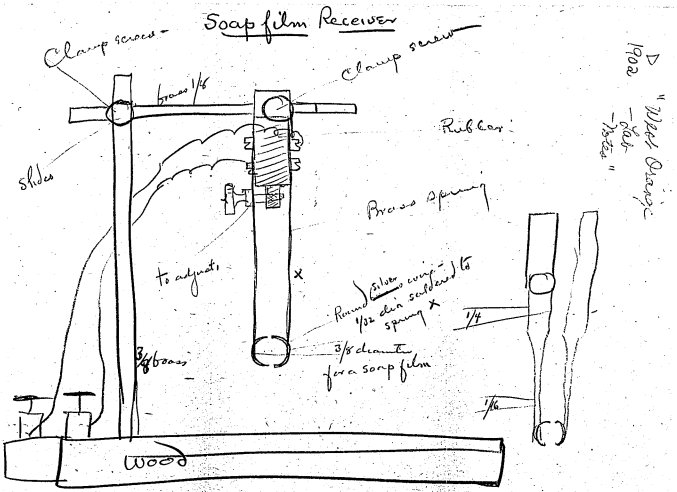

20/1000 platinum
platinum wire
20/1000 platinum
sediment
brass
thin platinum
platinum
1/4
1/2
glass
Clamp
1/2"
1/2" Brass
6
1/2 brass
4
4"
Wood Base —

[ON BACK OF PRECEDING PAGE]

U Bell

Model Furnished

Drawing Furnished March 3 1902


Soap film Receiver
Clamp screw
Clamp screw
brass 1/8
Slides
Rubber
Brass spring
to adjust
Round glass cover 1/32 thick soldered to spring
3/8 diameter for a soap film
3/8 brass
Wood
1/4
1/16
1902
"Wood Design - Glass - Water"

[ON BACK OF PRECEDING PAGE]

Formal Drawing
March 3 1902
J. J. Gill

Soap Film Receiver

Model Furnished

(1902) D 1902 West Orange – Lab – Notes

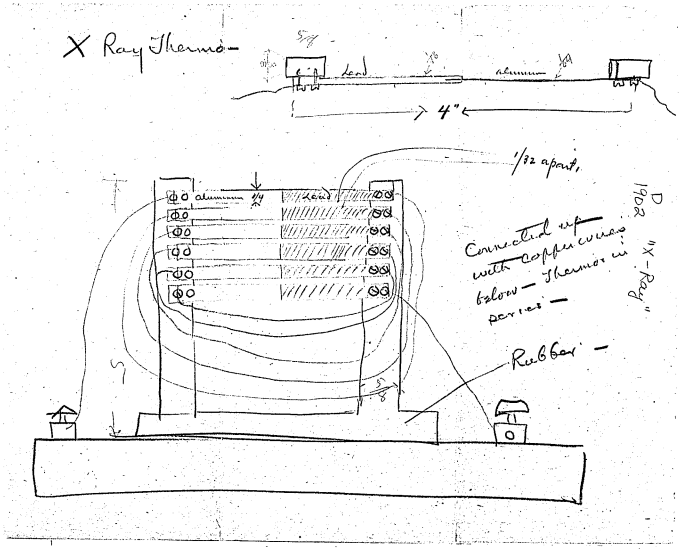
Make about 2 grammes of the following filings passing 150 mesh with all the filings out finer than 200 mesh. put each kind of filings in a homeopathic vial, make a wood holder with holes bored into it to hold vials & have covers – clean tile perfectly after each metal

Following filings wanted,

Silver, Lead Tin, Zinc, platinum Copper Cadmium Bismuth – Antimony, Aluminum, Magnesium, Iron, Nickel, Cobalt, Tellurium, gold, ~~[illegible]~~ Iron Sulphide, Iron pyrites, Port Henry Magnetite, Pyrusolite, galena, Calcopyrites, pyrohotite, peroxide of lead, powdered lamp filament from old Edison lamp, graphite, Nitride of Titanium Nitride of iron Brass, phosphor Bronze, Arsenic Sulphide of nickel, peroxide of Silver, Nickel arsenide: Speerylite, Mispickel, Chromium, ~~[illegible]~~ pumice stone soaked in Chloride of platinum & ignited, Lycopodium powder Coated with Silver in Vacuum by Wurth Tungsten Bronzes, phosphide of Tin Vanadium Dioxide & Vanadium Trioxide

Make ~~[illegible]~~ two more Electric furnaces like the one you made with Lime Blocks

But make the Clamps so any size from 3/4 inch to 1 1/2 inch Carbons Can be clamped Have the Carbons swing up just as in the first one, the height etc is OK —

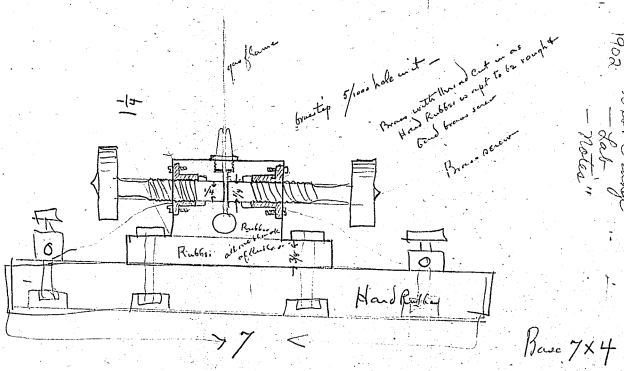

X Ray Thermo-
lead
aluminum
4"
1/32 apart.
aluminum
lead
Connected up with copper wires below — Thermo in series —
Rubber —
Proj. X-11
1962

[ON BACK OF PRECEDING PAGE]

Furnished Drawing March 5 1902

X Ray Thimo

Model Furnished



gas electrification apparatus

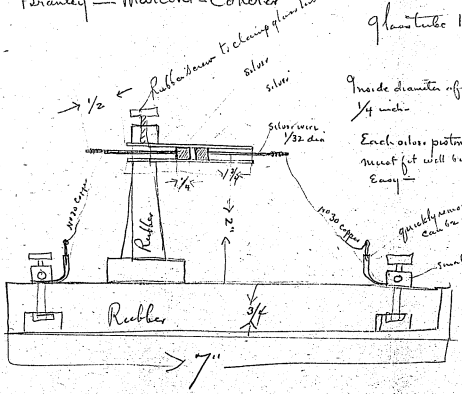
D. "Wind Gauge" — Shot — "Motor"
1902

Filed: D 1902

"Branley-Marconi Coherer"

Branley — Marconi - Coherer

glass tube 1 3/4 long



Inside diameter of glass tube 1/4 inch

Each silver piston 1/4 long — must fit well but go into out easy —

"Wires Orange - Red - Pieces"

D 1902

Make 20 tubes with pistons 00 & can employ 20 different things between the pistons — Marconi uses silver filings — want to test one tube & clear quickly put in another —

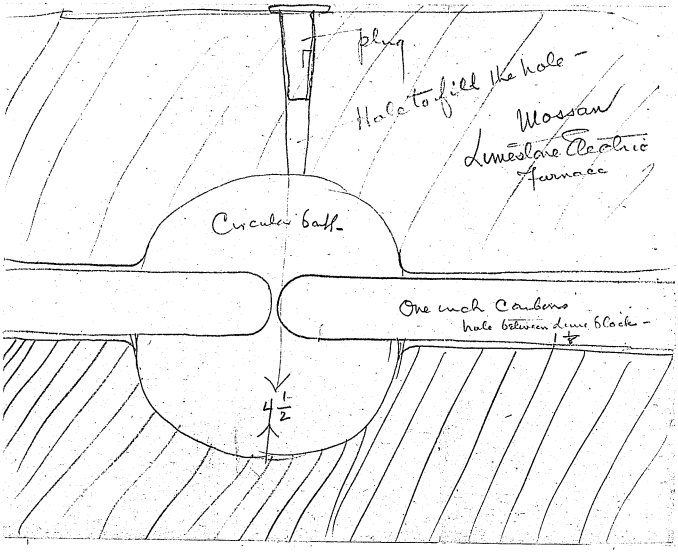
[ON BACK OF PRECEDING PAGE]

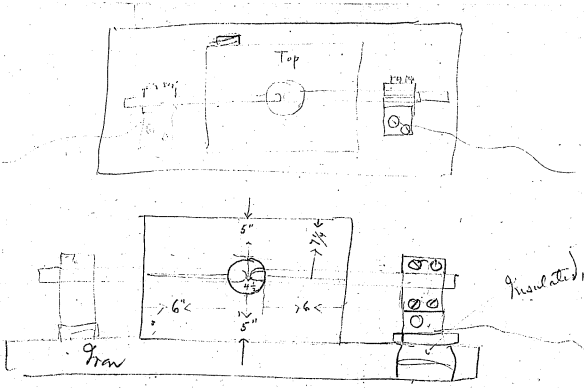
Branley Marconi Coherer

Model Furnished

Furnished Drawing March 5 1908

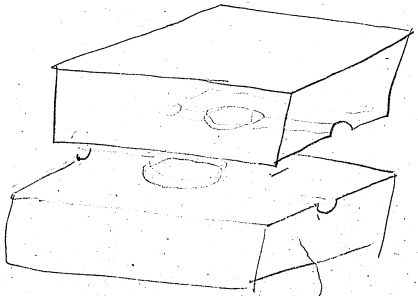
J. H. B.

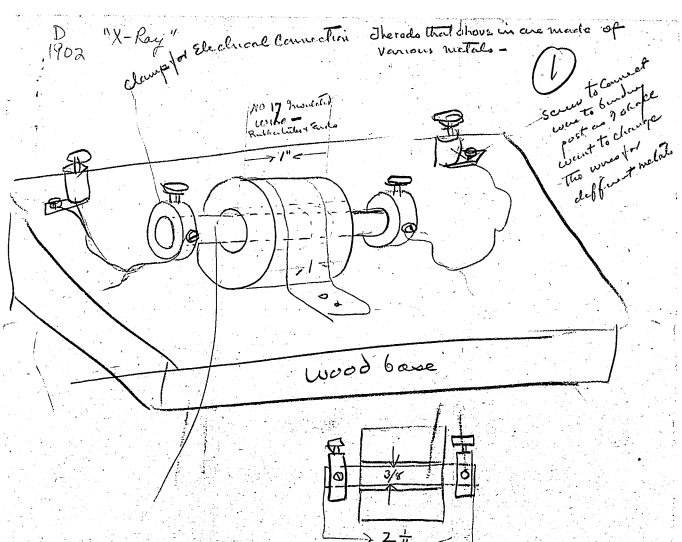

plug
Hole to fill the hole -
Massan
Limestone Electric
Furnace
Circular ball -
One inch Carbons
hole between Lime Blocks -
1 1/2
4 1/2



Want to use 100 amperes 110 volts —

The lime is to be in two solid blocks — get it from Alexandroville, ~~and~~ tell Darling you want 2 pieces of clear magnesian limestone,




D
1902
"X-Ray"
clamp for Electrical Connection
Rods that throw in are made of various metals -
1
Screws to connect wire to binding post on 2 clamps circuit to change the wires for different metals
No 17 Insulated wire
Rubber tubing Ends
1"
1
wood base
3/8
2 1/4

2

(2)

Make rods to go in the Cylinder of the following materials, I think Can probably do it best in Fletcher furnace in Chemical building in Berge

some can be made without Casting

Copper	Brass	Sulphur (Cast)
Zinc	Sulphide of Iron (Cast)	
Cadmium	" Copper "	
Tin	" Nickel "	
Lead	" Lead "	
Antimony (Cast)	" Silver "	
Bismuth "	" Tin "	
Nickel	" Antimony "	
Bismuth	" Mercury "	
Aluminum	Phosphide of Iron "	
Magnesium	Copper "	
Carbon – (Electric Light Carbon)	Nickel "	

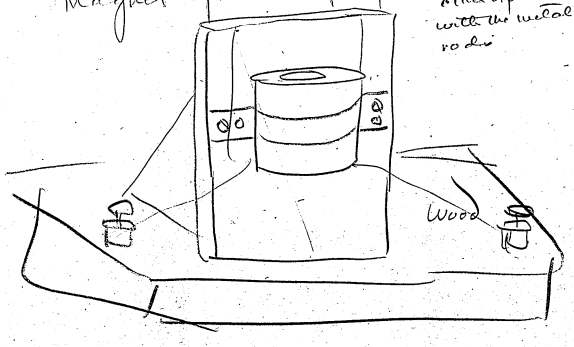
Mercury in glass tube with wires Thro' glass

Silver

3

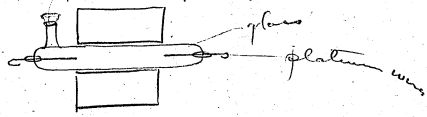
Make another Base with the Magnet panel upright = I want to try other Experiments with the metal rods

same size



(4)

Have Daily make 20 tubes to slide on the magnets, thus open so I can put liquids in flame out the end so can use a small cork.



[ON BACK OF PRECEDING PAGE]

Finished Evening March 5 1902
J. E. C.

Induction Coil
with Multi Metals

Model Furnished

D
1902

X-Ray

Number them

No 1 Vacuum

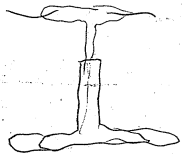
2 "

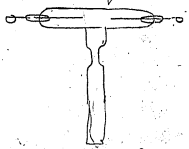
3 "

4 "

5 "

6 X Ray Vacuum





actual Size

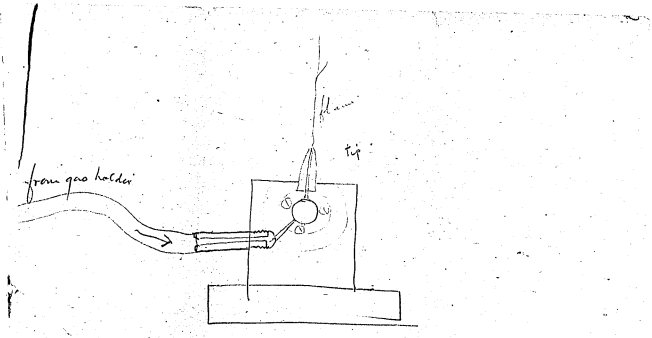
put 6 on the pump at once —
when spark spreads out from the wire
to glass seal one off — Then when it
gets thinner seal another, Then
after a while another The last
one to reach the X ray point
Heat all of them while exhausting

[ON BACK OF PRECEDING PAGE]

Ray Spark tubes

Model Furnished

Forwarded and filed March 11 1902 J.S.C.



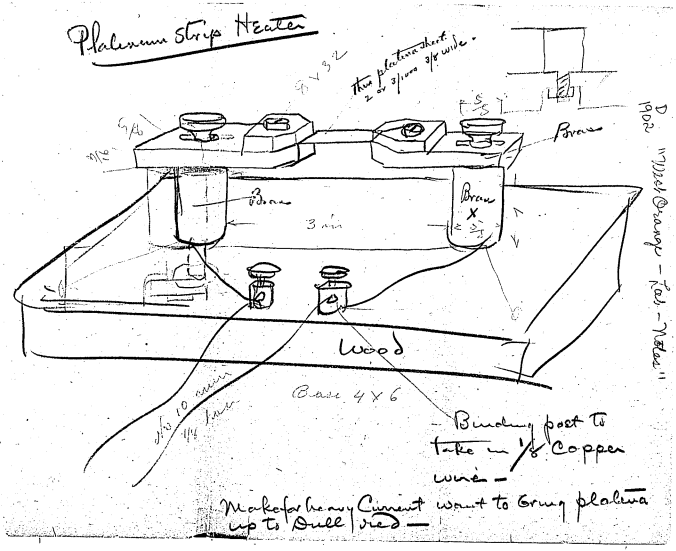
The gas passes up to the chamber between the ends of the screws & thence through the 5/1000 hole in the tip - the flame moves up & down when a static current passes from screw to screw — must be no leaks —

[ON BACK OF PRECEDING PAGE]

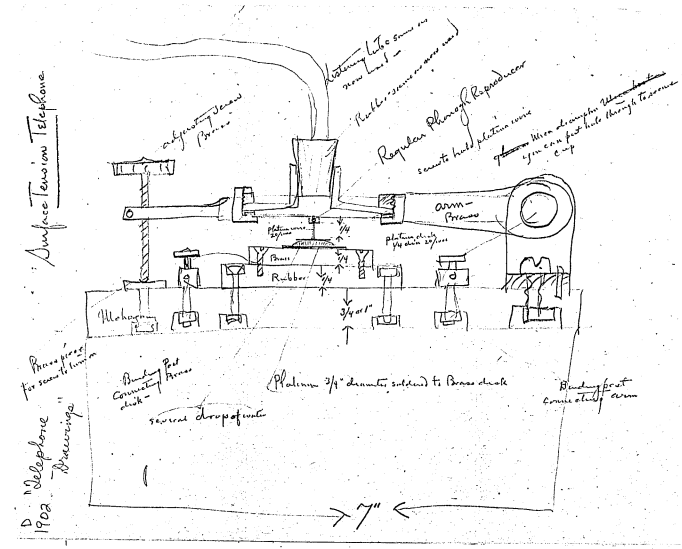
Eliminated Drawing
March 11, 1902
H. F. C.

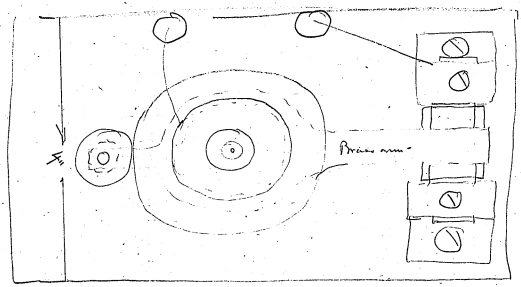
Gas Electrolytic Apparatus

Model Furnished

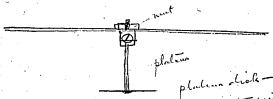


D
1902
"Wash Orange - Red - Yellow"


Surface Tension Telephone
Rubber
Mahogany
3/4"
7"
arm
Brass
Platinum 3/4" diameter, soldered to Brass disk
Brass press for secure tension
Brass Pot Connecting Brass disk
Several dropping tubes
Blind foot connecting arm
D. "Telephone Receiving"
1902



Top view



plaitum stick —
no other metal to be used
Holes pt in stick + wire rivets over
no solder used —

[ON BACK OF PRECEDING PAGE]

Surface Tension Telephone

Model Furnished

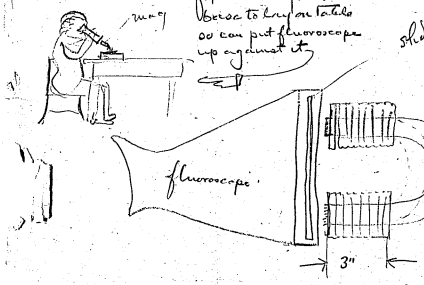
Furnished Drawing
Above of 12 1902
A. G. Bell

D
1902 "Fluoroscope"

Magnet for Fluoroscope

fix the magnet on a wooden
block to lay on table
so can put fluoroscope
up against it

slide with crystals in.



core 1 inch dia
made of No 20 or 22
iron wire & taped —
then 3 or 4 layers
of No 16 wire
wound around —

Make the magnet so it will be
about the same relative size to
the fluoroscope you are going to make
I will use the regular fluoroscope

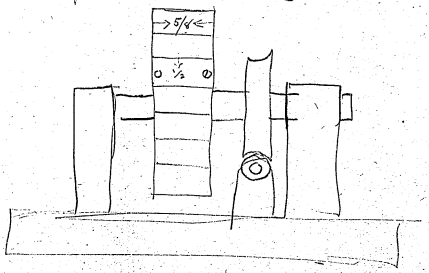
[ON BACK OF PRECEDING PAGE]

Drawing Finished March 21

J. H. Ott

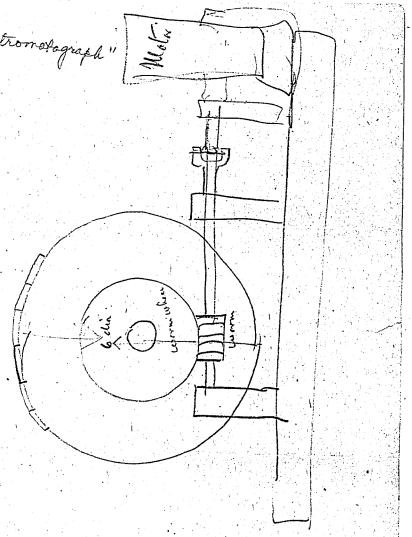
Model Finished
April 19 1902

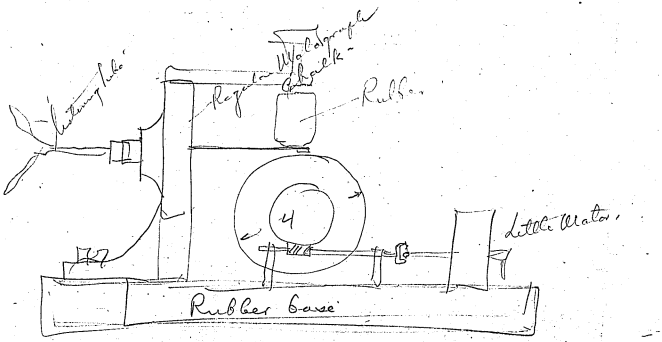
The wheel is of brass it has 36 sections each section of a different metal or material — These are to be either screwed on or fastened by solder or otherwise. They must butt at the edges so the surface of the whole wheel will be smooth, about 1 or 2 Revolutions per minute will be enough —



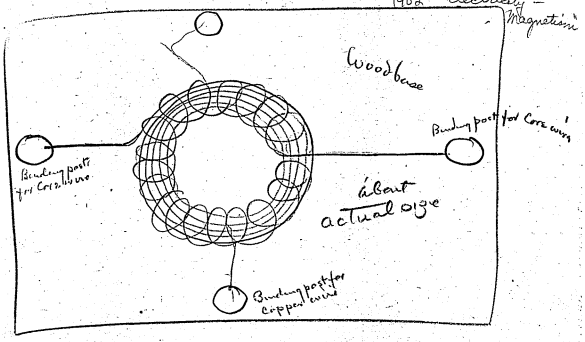
I shall want to put a band of paper around the circumference of the wheel & fasten it like we used to fasten the tin foil in old phons. a simple break in smooth surface will do no harm where it is used —

D
1902 "Electrometagraph"




Rubber Base

1902 "Electricity — Magnetism"



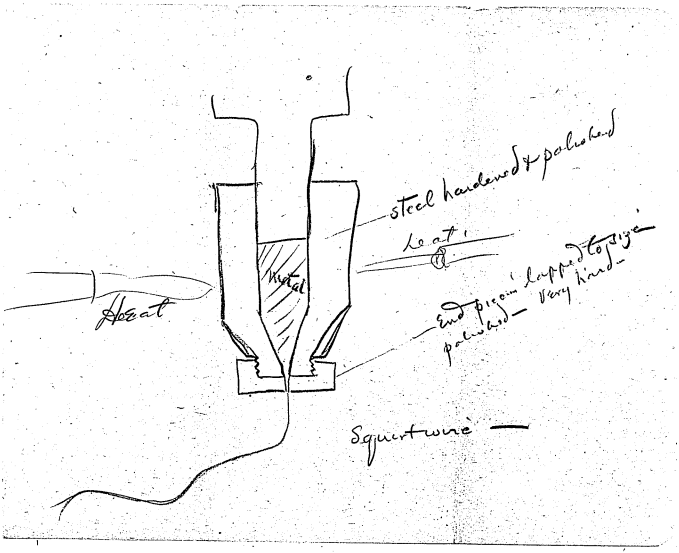
This is an important device. It is a transformer with Cores made of insulated wires of different metals, & over this is wound at right angles ~~and at~~ after taping — 2 layers of No 17 or 18 silk insulated Copper wire —

2. (2)

for making the core use wire anywhere from 1/32 dia or finer and in the case of the metals which are easily got in wires make the diameter of core 3/8 but where you have to squirt the metal a 1/4 inch diameter will answer — In all cases the wire must be insulated just like magnet wire — We had a wire covering machine once that could be rigged up if not you will have to find some way of insulating it = you can use for iron core insulated iron wire which you can buy I think, Bonnet wire,

Make the following transformers this way — all on separate cases —

~~Copper~~ The cores to be Iron, Copper, Zinc (wire or strips) Cadmium, Lead, Tin, Aluminum, Magnesium, Cambry Aluminum ~~of Magnesium~~ wire, Nickel, Cobalt (drawn thin) Silver 11 transformers


steel hardened & polished
Coat
Metal
Heat
End piece dropped to size
polished very hard
Squirt wire

[ON BACK OF PRECEDING PAGE]

Drawing Finished
March 26 1902

Model Finished April 10. 1902

The metals to be used are — Multiple Metal Wheel

1 Aluminum
2 Antimony
3 Bismuth
4 Cadmium
5 Graphite
6 Cobalt
7 Copper

8 gold plated brass
9 Iron
10 Steel, Tool
11 Lead
12 Magnesium
13 Nickel
14 Platinum

15 Silver
16 Tin
17 Zinc
18 Tellurium
19 German Silver
20 Brass
21 Copper got hot + rubbed with Sulphur
22 Manganin, Bergman sent a lot for Rosenthal
23 Type metal
24 Solder
25 Cadmium Tin solder used in Storage Battery

put brass in the spare places

[ON BACK OF PRECEDING PAGE]

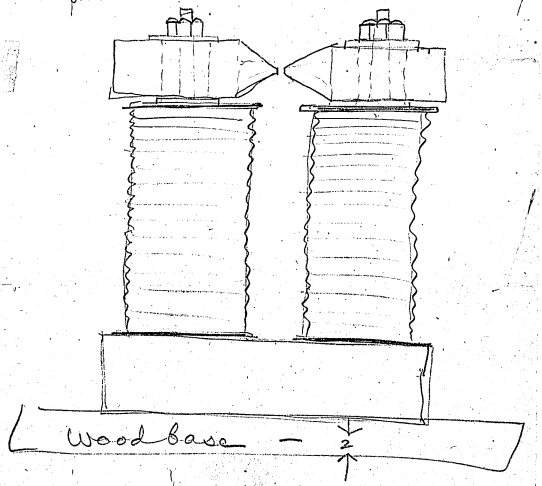
Model Finished April 18.

Multiple Metal Wheel

Finished Drawing March 28 1902

J.F.M.

Field Magnet from a No 2 3 or 4
Edison Dynamo — Think we have one
with moveable pole pieces that can be brought close in or far away
pointed.



[ON BACK OF PRECEDING PAGE]

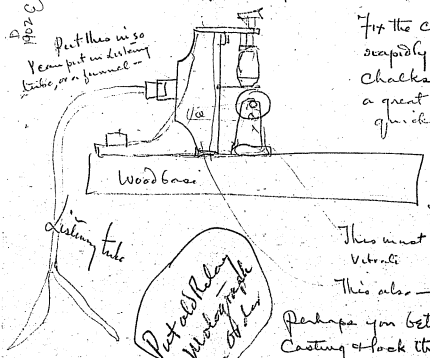
Found two Cores made prior
extension April 4. 1902 J.F.C.

Big Magnet

Mala-graph

Fix up Regular Mala-graph with worm + handle for hand turning, put it on good size Mahogany Base and stiffen it up so the diaphram holder is very stiff

Fix the chuck shaft so I can rapidly remove & replace chucks as I want to test a great many different kinds quickly —



put wood screw holes in base so it can be screwed to table —

This must be very stiff or it will vibrate

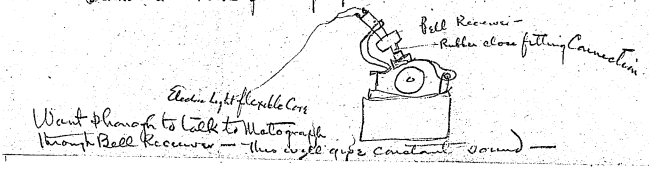
This also —

Perhaps you better make a brass Casting + lock the chuck shaft upright + diaphm together =

Electromotograph

Find a lot of our old Telephone Coils with primaries of various resistances and having some with a secondary alone + some with a secondary + tertiary coil — test them out + put them on Mahogany bases with good binding posts want 1/2 dozen varities —

Get a Bell Telephone-Receiver — + fix it so it can be attached + travel with the reproducer of a standard or Home phonograph —



Want phonograph to talk to Mutograph through Bell Receiver — thus avoid quite constant sound —

Make a Chalk Mould. so that there will be only 1/16. to turn off on a side to get right size get a tool made to go in Lathe provided with a phonograph shaving Sapphire to turn the Chalks —

The Mould should be strong so it can be worked on by screw press — You better make a tool with Cast iron or some Chalk to see how deep you have got to make the mould to get the right length after its pressed — you should allow 1/8 off each end to true chalks up — Get some & polish die & punch highly & make them quite hard get phonograph from Edison —

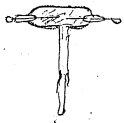
[ON BACK OF PRECEDING PAGE]

Furnished Mimeograph Drawing April 5.1902

J. B. C.

Mimeograph

D
1902 X-Ray



actual size

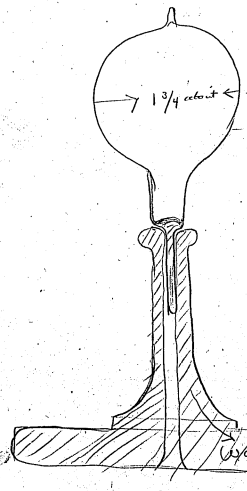
50 of these

to be filled with Crystals
& exhausted to X ray
Vacuum - these got ready
so I can fill with Crystals
when I return in April

[ON BACK OF PRECEDING PAGE]

Models Finnished
April 7 1902
J.E.C.

D
1902 X-Ray



Vacum bulb
Exhausted very high
~~about~~ above X ray
point if possible for 3
bulbs & 3 bulbs exhausted
to X ray point –
One stand will do

Dally can put on a bulb with
wires in along with
those & tell when X
ray point is reached
then cut off
3 & then run
till tube shows
nothing & cut off
the other 3 &

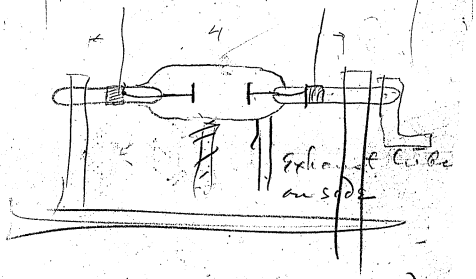
Mark X ray point bulbs
X Ray bulb – the other Beyond X Ray

[ON BACK OF PRECEDING PAGE]

Model Finnished
April 7 1902
J. F. O'H.

D
1902

X-Ray
5 1/2



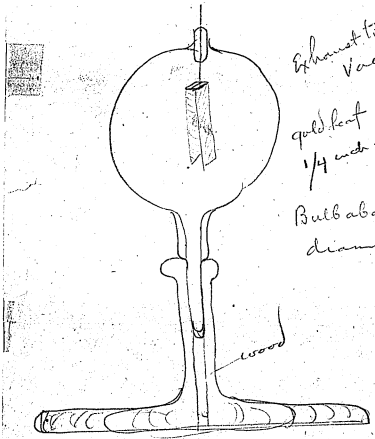
1/2 doz — 2 exhausted

beyond X ray & if to X ra

John Ott has drawing
for the rest —

Dalley D 1902 Electricity - Electrometer A

Make me 3 gold leaf Electrometers



Exhaust to high vacuum

gold leaf 1½ long ½ wide 1/4 inch apart.

Bulb about 2½ inch diam

[ON BACK OF PRECEDING PAGE]

Model finnished April 8 1902

Electometer

J. S. C.

D
1902 "X-Ray"

Want an X Ray Induction Coil Medium size
with air break all ~~mounted~~ ready
to be rigged up when I return
also 1/2 dozen small & large
X Ray tubes in Box —

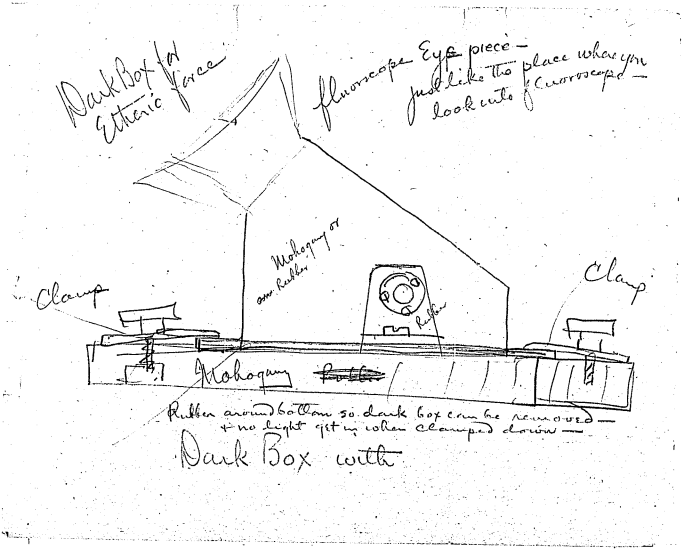
Find one or two of our old tuning
forks with Magnets + Contacts or
also Couple of vibrating reeds
with Magnets & put them in
order —

[ON BACK OF PRECEDING PAGE]

This I ordered they
sent it up from Pharm Works
in such bad condition I
had to send it back

Because pure drum [illegible]

X Rec'd Oct. - Dec. —
Tuesday (Oct 6)


Dark Box for Etheric force
fluoroscope Eye piece — just like the place where you look into fluoroscope —
Mahogany or some rubber
Clamp
Clamp
Rubber
Mahogany
Rubber around bottom so dark box can be removed — + no light getting when clamped down —
Dark Box with

[ON BACK OF PRECEDING PAGE]

Ink Box for Etheric Force

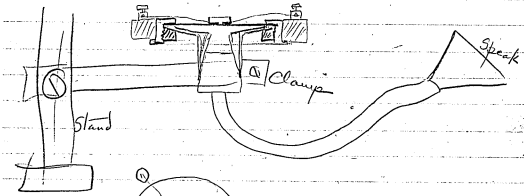
Finished Drawing April 12 1902

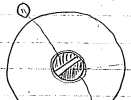
Fin Model April 28 1902

D
1902 "Phow.-Drawings"

Finnished April 21 1902

J. F. Ch.



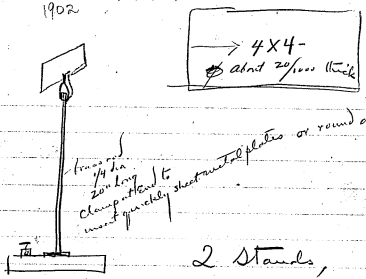


Rubber ring 3/8 dia
silver foil on glass but split
with 1/32 of inch between the
split - one half of silver is
Connected to one binding post
by No 36 Cop over another 1/2
to the other binding post

The Cup + silver shellacked to the glass silver
powder is to go put in Cup the vibrations
disturb the silver. -

D
1902

W.O. - Lab - Notes



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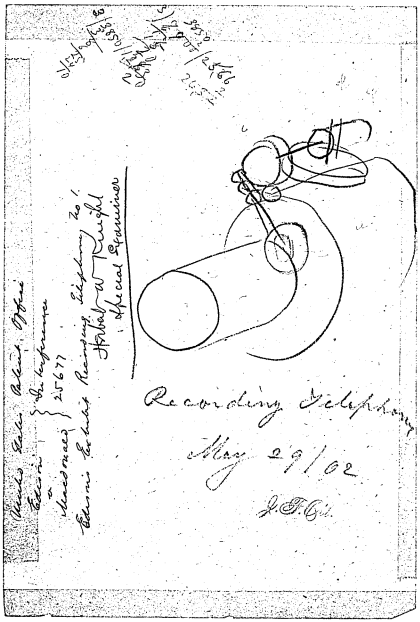
Furnished Model
April 28 1902

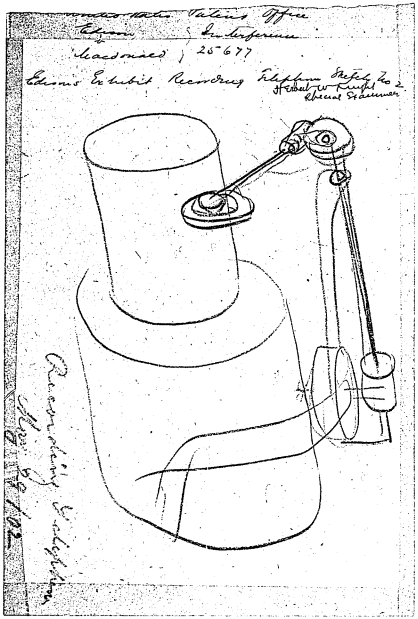
J. F. C.

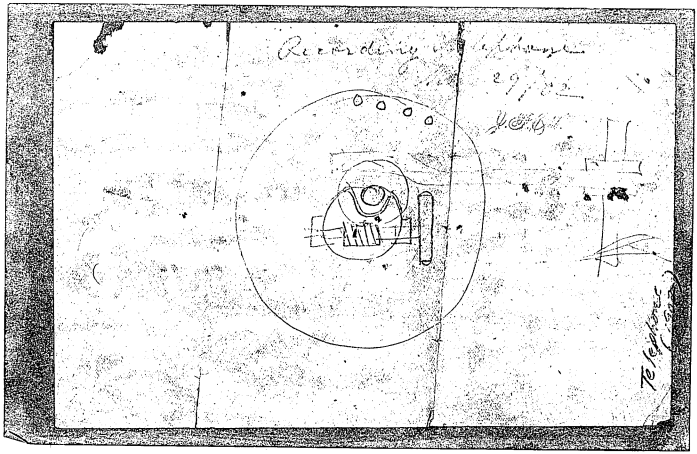
D
1902 "Telephone – Drawings"
See also, Electromotograph



D
1902

"TELEPHONE —
Drawings"




Recording telephone
Telephone
Cases

D
1902 "Electromotograph"

John Ott –

Make Molograph pens
of Port Henry Magnetic ore, get a crystal
there is some in top floor Library
among the new ores –

Another pen of Iron Pyrites +
" Monosulphide of Nickel.
" gold –

May 1902

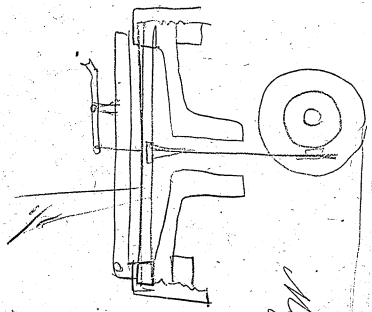
J. F. Ott.

Made Mole. Cabinet Office
Ex. – Electromotograph
Lecture – 25 (77)
Return to Lect. Rect. – Lect. Rect.
Hold – until Lighted
Special Reminder

D
1902 Telephone – Drawings

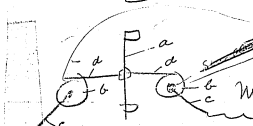
United States Patent Office
Edison
vs
Macomber
Interference
25677

Edison's Exhibit Showing Telephone Patent No 3
Herbert W. Wright
Special Examiner



May 1902

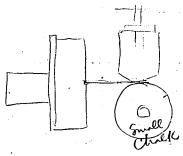
yarn - Make these

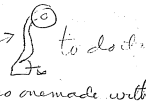


large chalk -

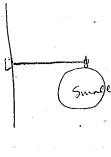
Make this double one

should get twice the volume of frame
so resistance can be got low + both
increase + diminution of friction will help.



use →  to do this with

also one made with
Reg phosph deapne



Ball or rounded point -
50/1000 diamt

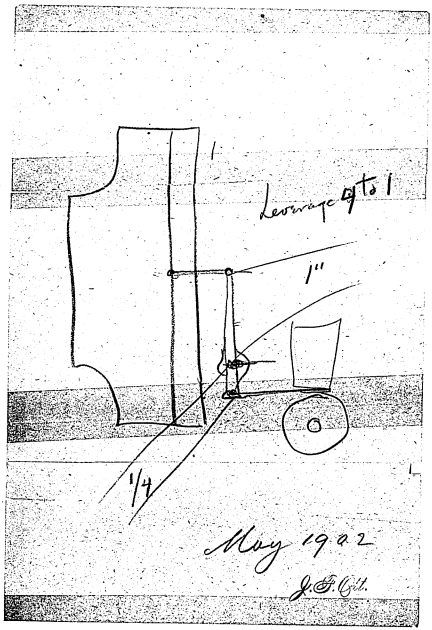
one of platinum
" Pt + Irid
" Iridium
" ~~Osmiridium~~
Nickel

J. F. Ch.

Make these points
about 1/8 to 1/4 long
+ firmly mounted + fastened
" end of arm -

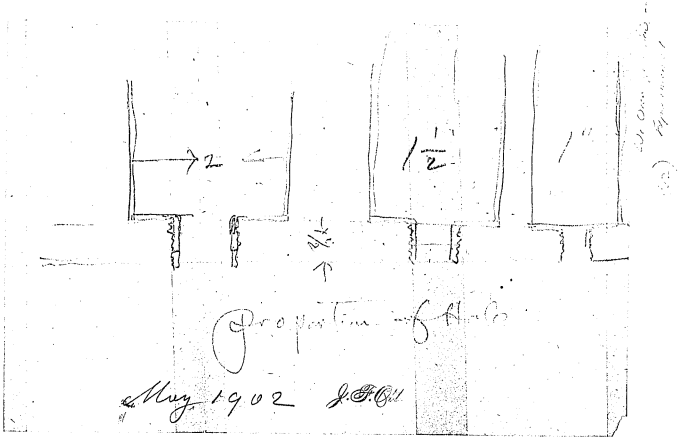
Osmium Iridium

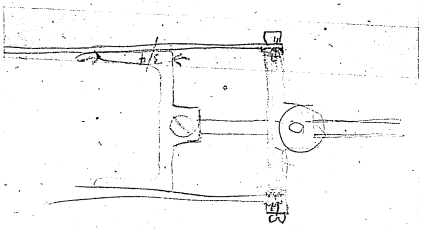
May 1902



W. Orr Jr — Feb. —
(1902) Experiments

May 1902
1024
3.25
5°
8°
16
29
55


2
1 1/2
1"
1/2"
Proportions of Heads
May 1902 J.E.C.



May 19.02

J. F. Ott.

(1902)

John –

Have Freddy Ott & Francke work on these pine, I must go to Cement works Monday Tuesday & Wednesday

Edw

May 1902 S.F.O.

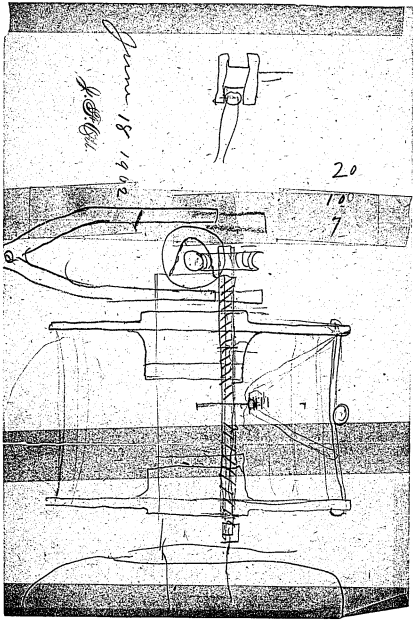
D
1902 "Electromotograph"

John May 1902

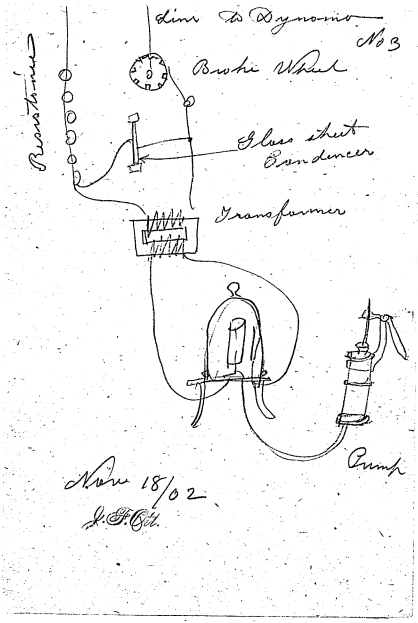
Make following Cylinders for small Mala graph ~~[illegible]~~ make them same size as Charles w Rowe mounted on ~~[illegible]~~ bore them out to size do not turn off on surface ~~[illegible]~~ Freely off will ~~[illegible]~~ turn them to size

Sulphide of Copper
Best Thermo pile of Sulphate makes it for you

Metallic Magnesium
" Aluminum ✓
" Iron or Steel ✓
" Antimony
" Zinc ✓
" Cadmium ✓
" Bismuth ✓
One of Bone ✓
" " Horn ✓
" " Glue
" " Walrus hid
✓ paper, bond paper cut in disks
✓ Mica I will give you a piece to turn it from
✓ Steatite (Soapstone)
French kid leather
✓ Sheepskin parchment cut in disks
✓ Rawhide
✓ Bamboo



(1902) W. Orange Tel. — Experimental



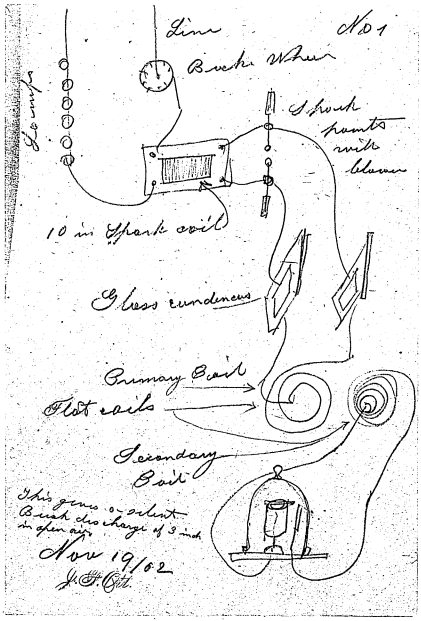
Nov 18/02
L. E. Ott.

Nov 19/02

Mr Edison

Looking through this Electrical World of Nov 29/02, the Plating in Vacuum is old, do you not think it would be best to try every thing so as to cover up all loose holes, I have made up two styles make 1 and 2 that look very fair, I told Mr Smith to try this perhaps you can give us some points on this

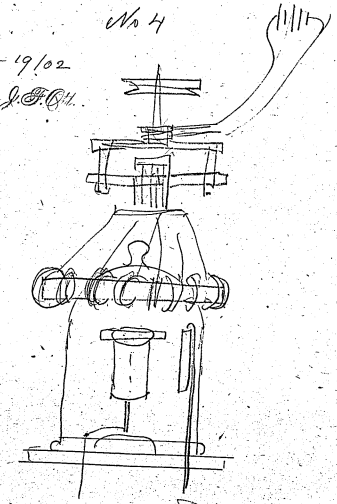
J S Ott


Line
No 1
Buck Wheel
Spark points with blower
10 in Spark coil
Glass condenser
Primary Coil
Flat coils
Secondary Coil
This gives over 2 inch Brush discharge of 3 inch in open air
Nov 19/02

No 4

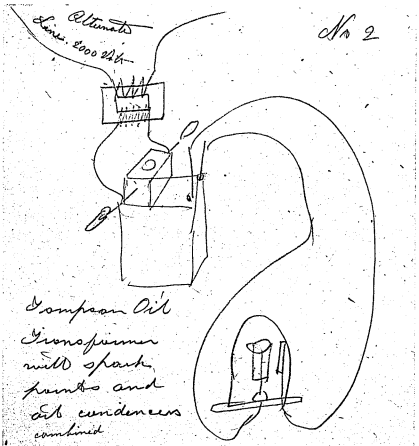
Nov 19/02

J. F. C.



In this device the Magnet does not revolve but the lines of force do

No 2



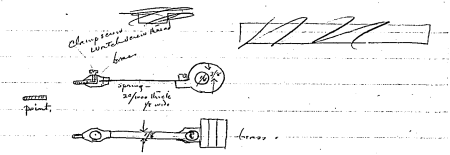
Tompson Oil
Transformer
with spark
points and
oil condenser
combined

This gives a vacuo discharge in
open air

Nov 20/02

J. T. O'H

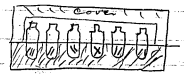
(1902) P 1902 Pen, Chemical



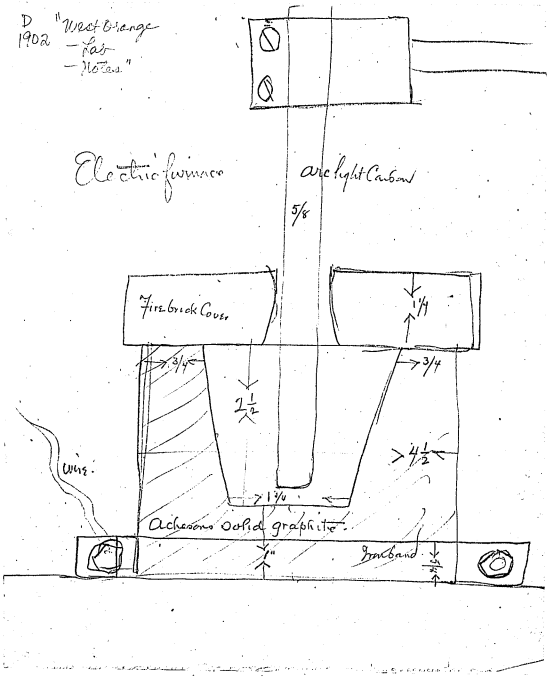
Chemical recording pen holder = Make one holder, and following points — 3 of each

Platina, Silver, Copper, Lead, Zinc, Cadmium, Bismuth Antimony, Aluminum, Magnesium, Tin, Iron, Nickel, Cobalt Tellurium 6 points — gold — Silicon, Graphite, Phosphide of Lead Phosphide Iron, Sulphide of Lead, Sulphide of Iron, Sulphide of Nickel, Pyrosulite, Thallium, Indium, Arsenic, Chromium — Tungsten, Phosphide of Tin, Tungsten bronzes, Vanadium Dioxide.

Make a board + bore little holes in to put homeopathic vials of the smallest size actual size, Reversed Can get them — put points in different bottles + label them + cork them

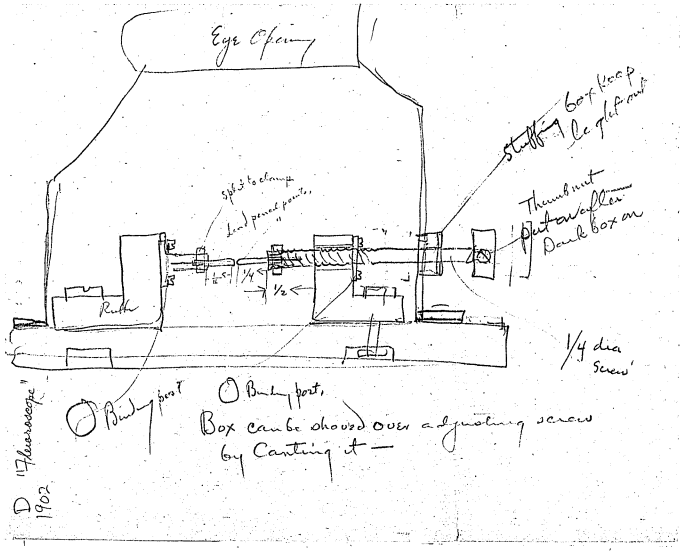


D
1902 "West Orange
— Lab
— Notes."



Binding Posts used one for Each angle post

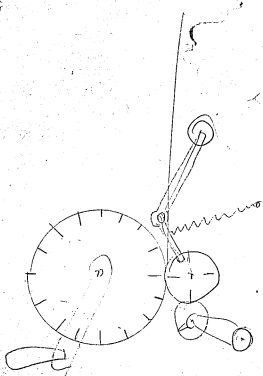
"The Wireless" A 1908


Eye Opening
Box Hook
Thumbnut
Dark Box on
1/4
1/2
Ruler
1/4 dia
Screw
Bushing post
Bushing post,
Box can be shoved over adjusting screw
by Canting it —
"Phenoscope"
D
1902

Unbound Notes and Drawings (1903)

This folder contains dated notes and drawings from 1903, as well as undated material possibly from the same year. Included are items by Edison, John F. Ott, and others pertaining to phonographs, phonograph records, electrical meters, kinetoscopes, and other matters. Some of the phonograph material involves a disc phonograph. Several items were witnessed by Ludwig F. Ott and Frank L. Dyer.

Approximately 60 percent of the documents have been selected. Among the items not selected are several fragmentary memoranda by Edison and drawings by John F. Ott of machine tool parts for making storage battery components.

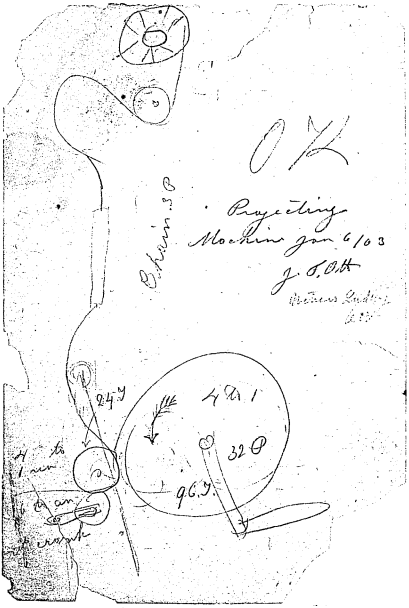


Movement for Hents

Jan 6/03 J. F. Otto

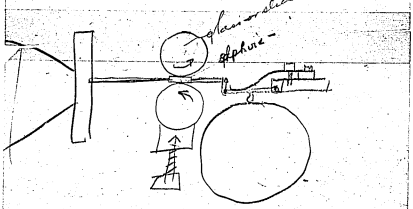
Victoria Building Calif

Order No 1397


OK
Projecting
Machine Jan 6/03
J. T. Ott
Witness Lindley
Spring 3 B
24 Y
4 A 1
32 B
96 Y

No. 2

Loud Speaking Phono



J. G. Ott

Jan 14

Jan 13 1903

63

Patented Lodging cart

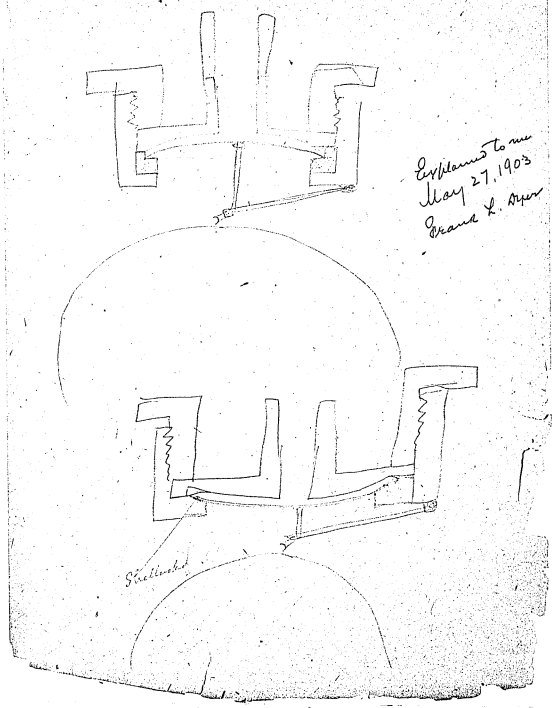
7 62

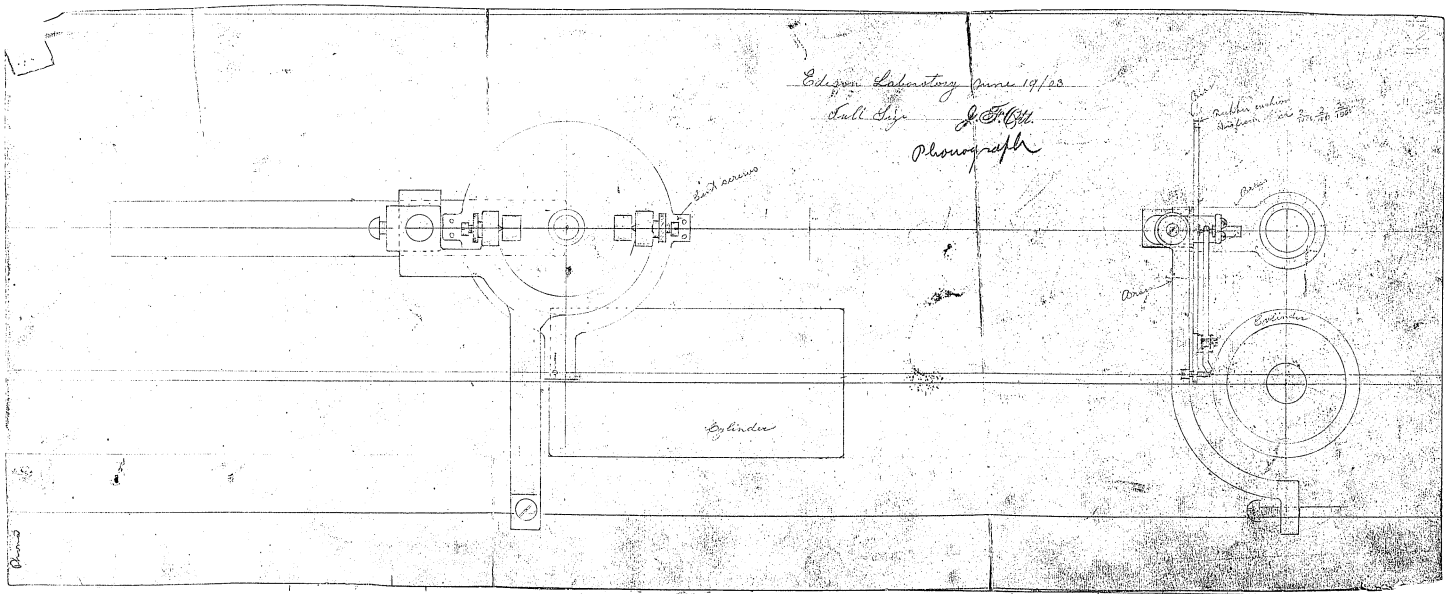
PHONO. —
Loud Phono. (1903)

Mons. Sketches

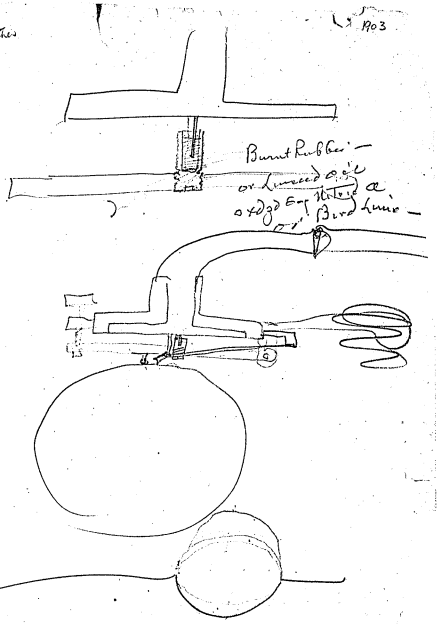
1903

May 27 1903




Edison Laboratory June 19/20
Full Size J. F. Ott.
Phonograph
Cast screws
Cylinder
Rubber cushion
Cylinder

Phono Sketches 1903



Explained to me
June 2d 1903.
G. L. Piper

Cable Address "Edison, New York"

190 3

From the Laboratory of

Thomas A. Edison.

FRANK L. DYER
JUN 23 1903
ORANGE, N.J.

Subject: _____ to me

Orange, N.J.

Forming Matrix's for producing phono records first plate with gold by Vacuum process then form in Electrolytic bath a coating of Nickel about 005 to 010 thousandths thick & afterwards, plate with Copper until the required thickness is obtained. 1/5 = The coating of Nickel against the gold is for the purpose of preserving the record from Corrosion due to the impurities & general acid characteristics of the ingredients used with Copper

Cable Address "Edison, New York"

From the Laboratory
of
Thomas A. Edison.

Subject _____ Orange, N.J.

Oxidation takes place & the mould is
now destroyed = nickel can be flashed by
vacuum & nickel plated the more test goods before
Claim — gold surface
backed by nickel —
ditto & nickel backed by another
metal preferably Copper —
Claim nickel alone —
& other Claims —

Letter — note at present time
all the competitors use Copper
without any coating & thus develop
mould — Also take out

Cable Address "Edison, New York."

From the Laboratory
of
Thomas A. Edison.

Subject: _____ Orange, N.J.

another patent for Nickel plated on a record coated with graphite without any Vacuum process —

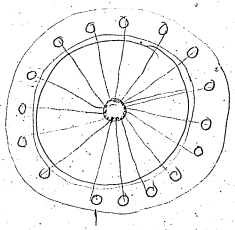
Young 1478 of 1904

Also with graphite & silver thinly coated & afterwards thickened by Copper plating —

See Edison 382-419 May 5, 1888.

Look up all previous patents & see what has been done so we can cover the field —

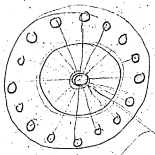
Phonograph



June 1903

(Phonograph)

gold beaten skin

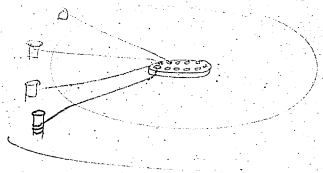


June 1903

One of 1"

One of 2½ ⅜ Lick

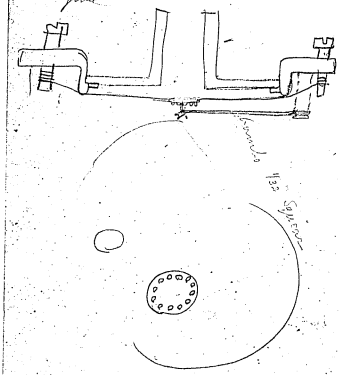
phonograph



June 1903

(phonograph)

June 1903



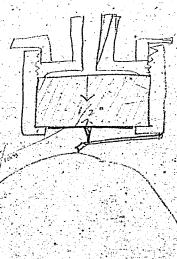
Aug 15/03

I think you can make holder for battery pockets by permanent magnet.

J. F. Ott

(phonograph)

Aug 1/1903



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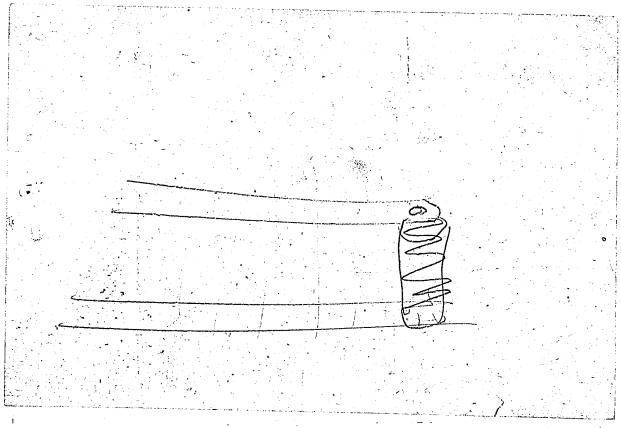


Phono: sketch

Gum Dextrine – [illegible] pasting [illegible]

glycerine rubbed on Rubber will prevent

paraffine [illegible]

glycerine –

Molasses Candy –

Sept 1903 Phonograph

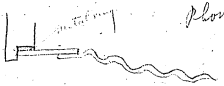
Silicate Soda –

Marine glue –

gutta percha ——— S. nucleic –

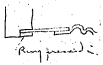
" in chloroform or Benzol –

Gutta percha very hard on it surface and by heat.



Phonograph

Sept 1903 Zinc



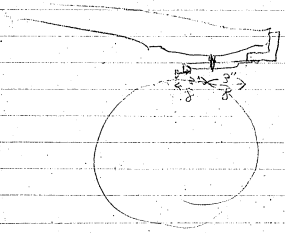
Thick acetate of Alumina

" Magnesia –

Phosphate + Oxide of Zinc – Used by Dentist to fill teeth acts hard in 20 seconds –

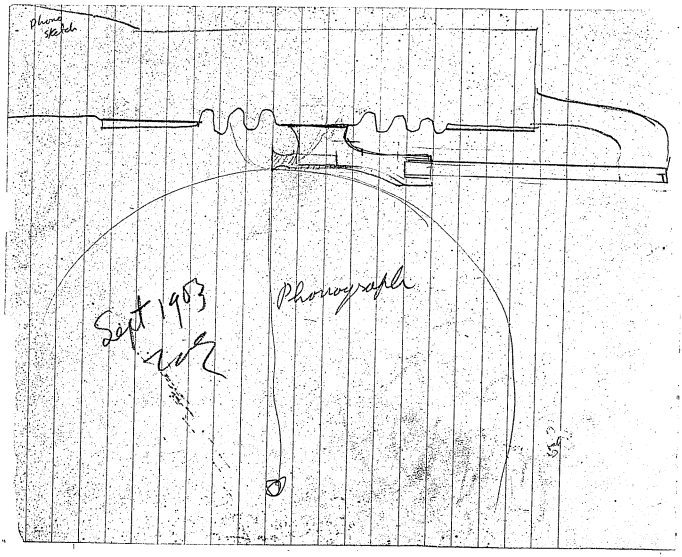
Burnt Rubber – burnt hard

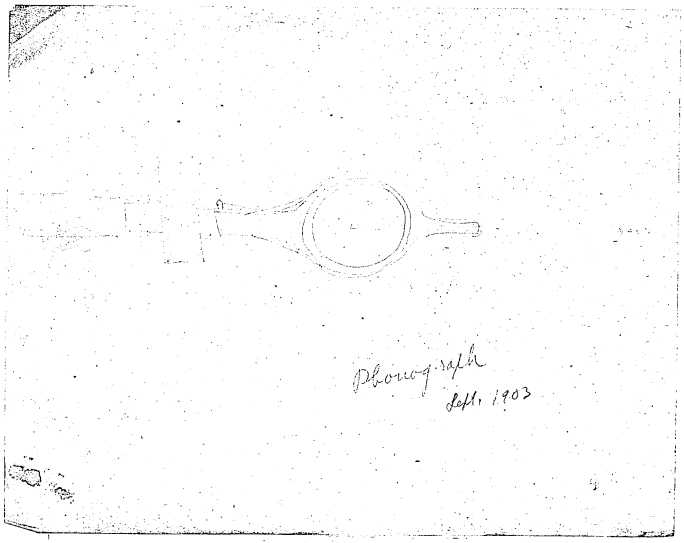
Phono - sketch

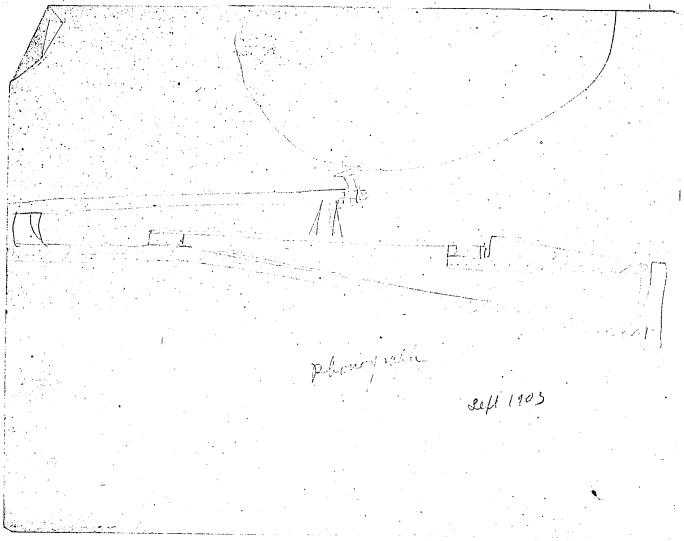


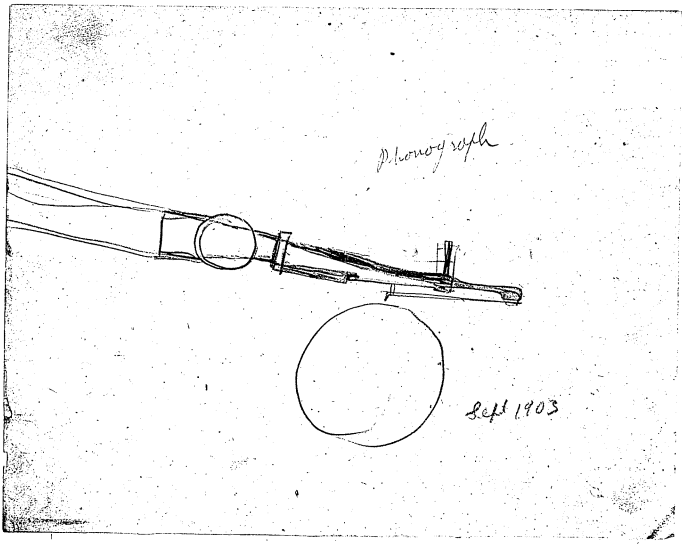
phonograph

Sept 1903

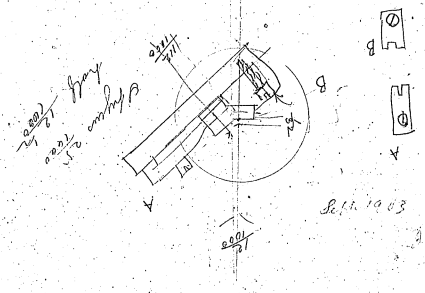

Phono sketch
Sept 1953
Phonograph
5


Phonograph
Sept. 1903


phonograph
sept 1903

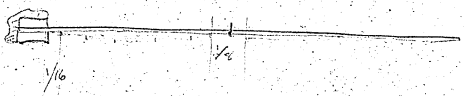

Phonoscyph
Sept 1903

Phonograph



Sept. 1903

phonograph



.001 Mica well annealed

Sept 1903

h
12
12
photographs
Apr. 1963

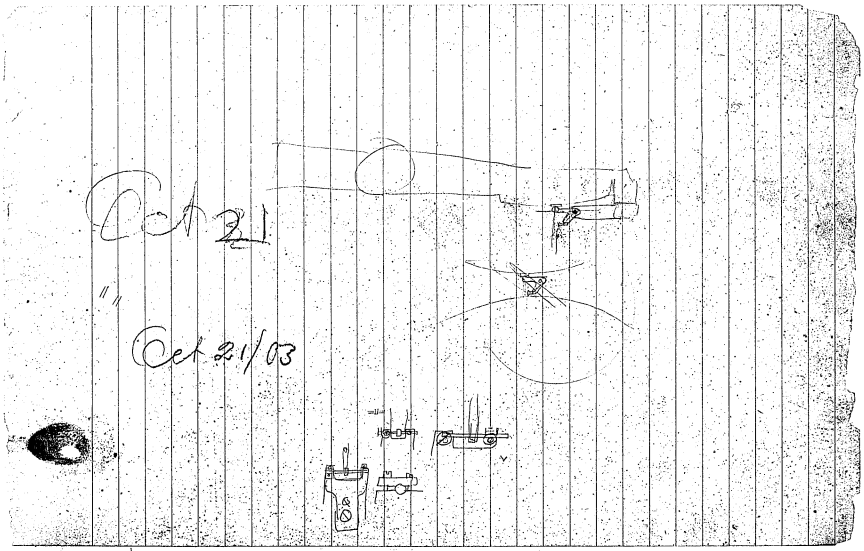
1 dia Req .003 —
1 " 1 inch 003
3/4 —
1/2 —
Photographs
Sept 1903

Photographs
Scale 1/3 size
12"
62/1000
31/1000

Cont 21

" "

Oct 21/03



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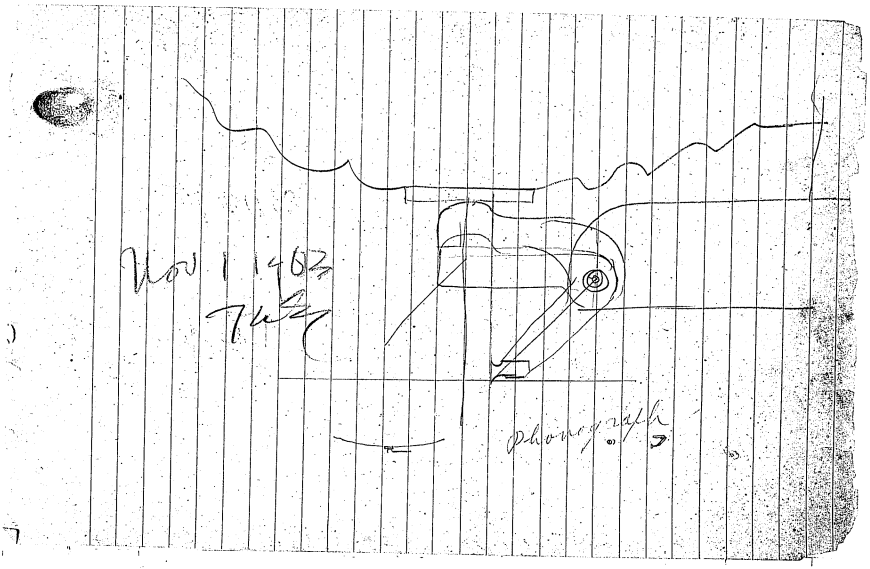
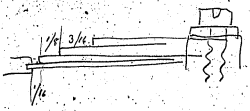
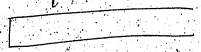


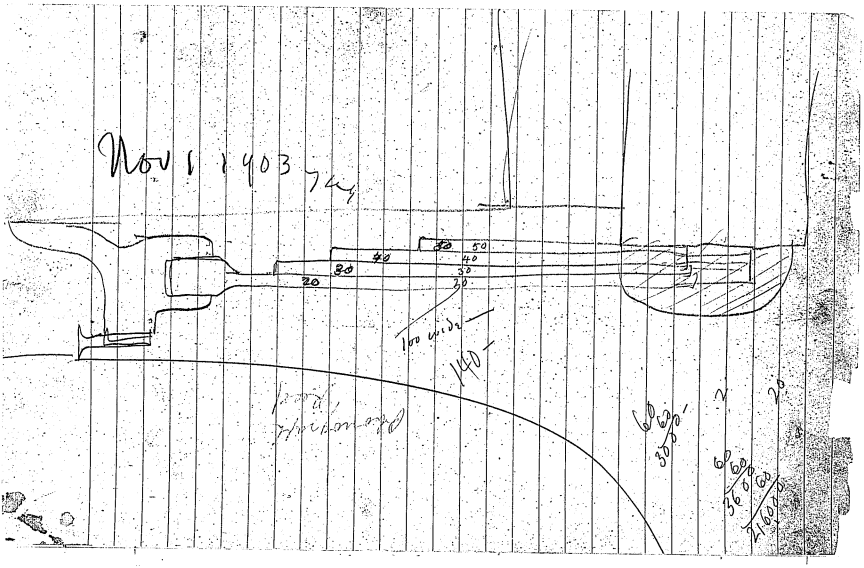
phonograph
(Reed)

20 - 40 50 80



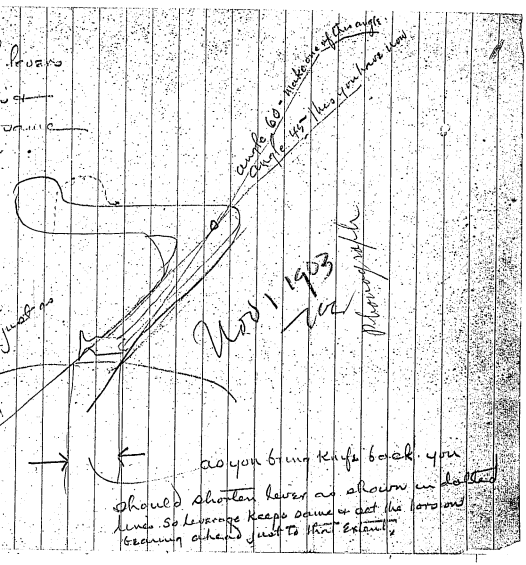
Nov 1 1903



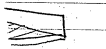

Nov 1 1903
20
30
40
50
100 wide
140
60
3000
60
36000
210000

Make the 45 + 60 angle levers
& put on different recorders &
spring dynamometer about same
so we can test one recorder
after the other & get a good
Comparison.

May notification till
Friday afternoon
Get both recorders unpacked
& get forward so dynamo
shape & get keep dynamo just as
don't just get keep
Demonstrate as possible
If you get good results say
nothing to anybody
about it

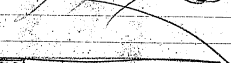


Phono - sketch



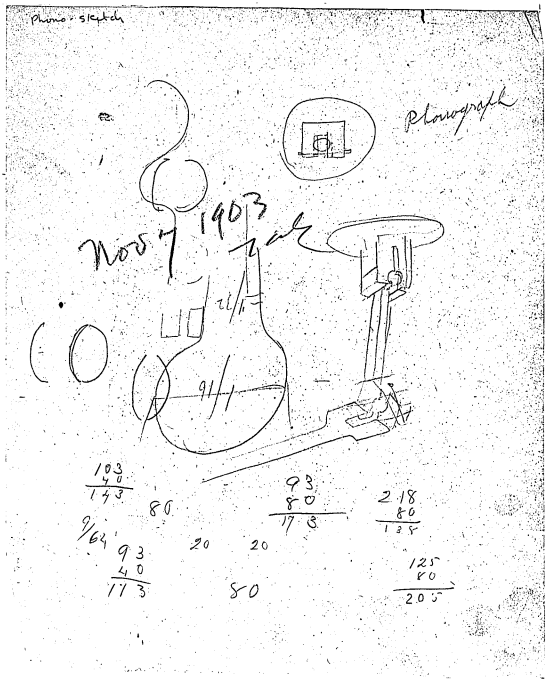
phonograph

Nov 1 1903



Mod 1403
5 mm
60
5 mm
4"

Phono - sketch

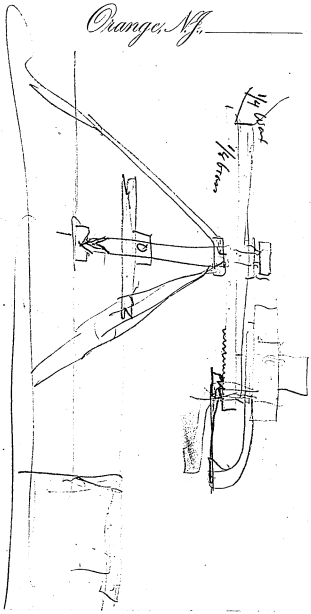


Cable Address "Edison, New York."

From the Laboratory of Thomas A. Edison.

Orange, N.J.

Subject, Phono Disk Phonograph



12.

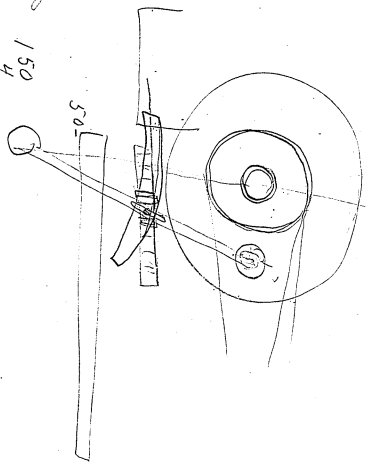
4-6-

Cable Address "Edison, New York."

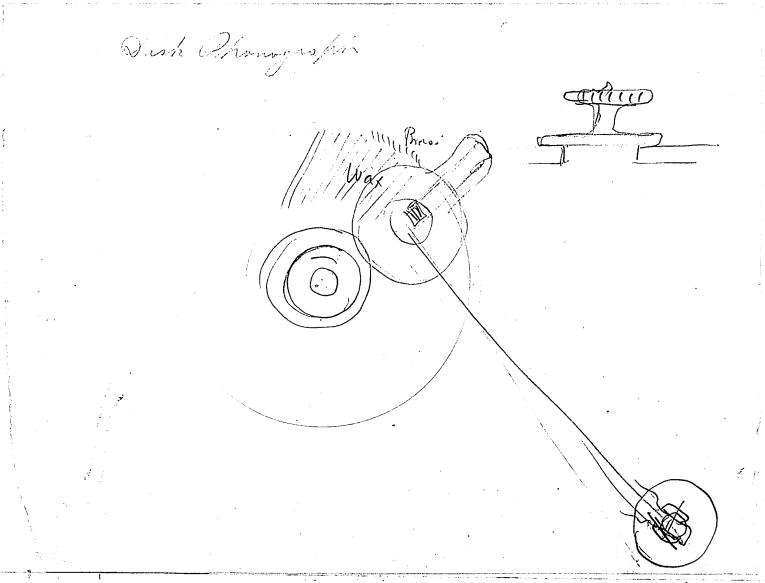
From the Laboratory
of
Thomas A. Edison.

Subject, Disk Phonograph

Orange, N.J.



Disk Phonograph

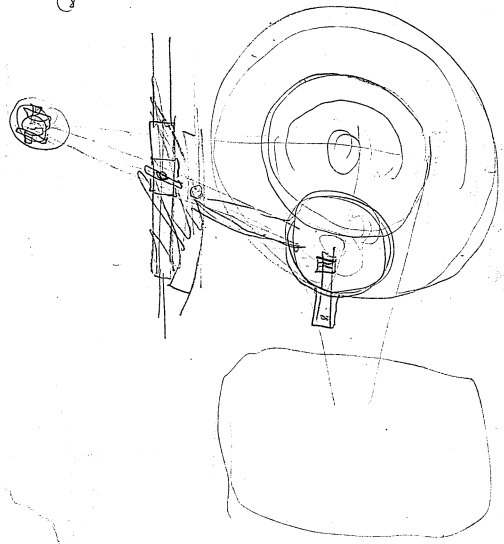


Cable Address "Edison, New York."

From the Laboratory of Thomas A. Edison.

Subject, Note Phonograph

Orange, N.J.



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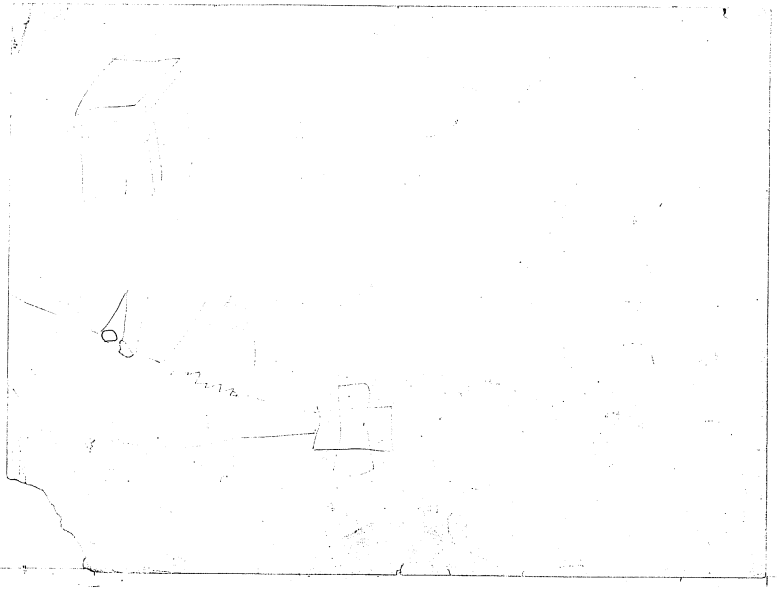
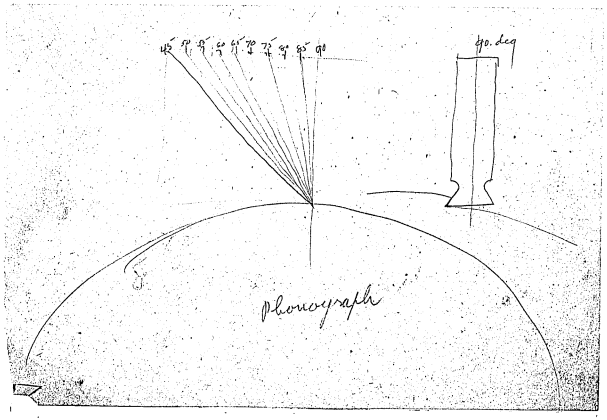
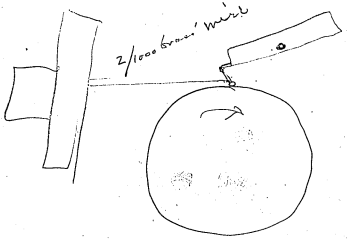
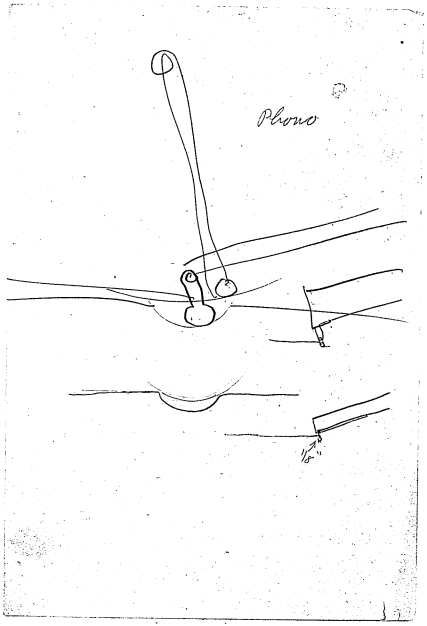



90. deg
Phonograph

Phone

Phono




Plomo

Shaft —	3
Handle —	2.5
Dia Ring —	1.5
bottom Ring —	2.5
Frame —	9 — 4
	1 — 5
(a) —	2
Mac Screws —	3
(finished) —	
	2
	.5 — 2
	1 — 2
	2
	1
	5 — 8
Drum Iron —	4
	41

Ring Cast —	41
Turning up etc —	2
Jacking —	2 — 1
	1
	.5
Regulator	3
	49.5
	19.3
	68.8
assembling packing testing, painting —	12
	80

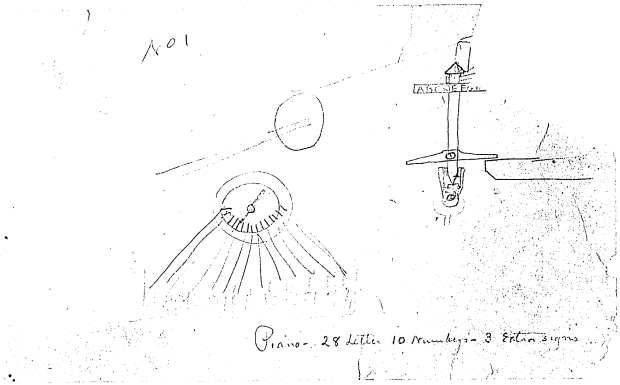
Stock

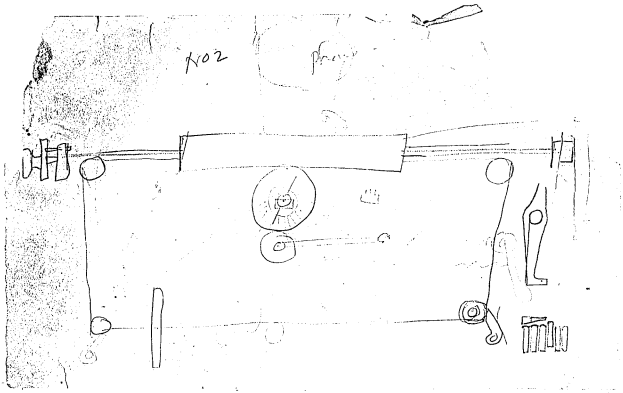
Rubber rings —	1.5
glass —	~~3~~ 1
Drum — Iron —	3
Steel —	2
Tin	6 — 3
Hard Rubber —	.5
Wrot Iron —	.3
Cast Iron —	2.5
Rest — Stock	1 .5
	19.3

90
80
30
23
24
20
25

3
2.5
1.5
2.5
5
1
1
1.5
3
2
0.2
0.2
2
1
3
4
1
0.5
3
6
43.9

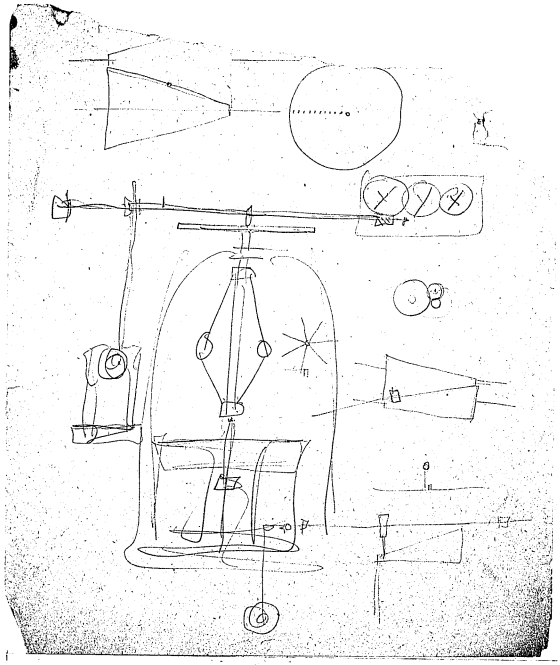
44
14
58 Coat
2.9 — depon
1.7 simple depon bonds
19.0
81.6
16
97.6
9
45
2.3
47.3
1.3
47.6
1.6.0
63.6
1.3.6
76.6


No 1
ABCDEF
Piano - 28 letter 10 Numbers - 3 Extra signs


No 2

Freddy Ottl =

Make one meter as per drawings, using Volute spiral of 1/32 pure silver by annealing it you can thread it through the glass cross which should have holes through, think it can be made of solid glass not a tube -



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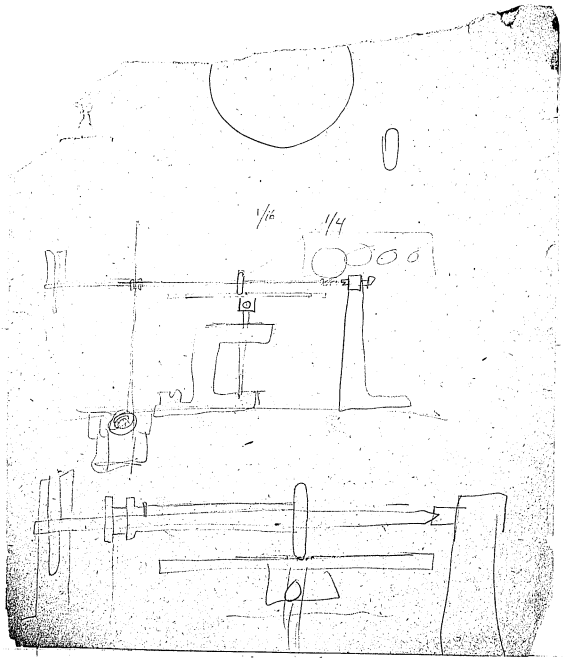
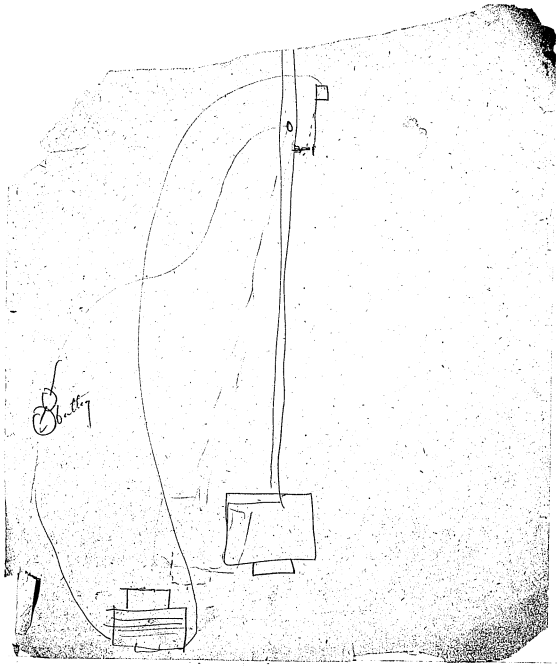
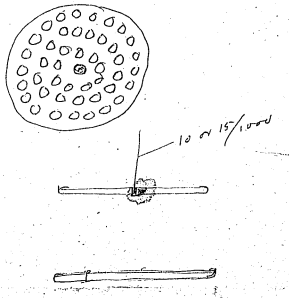




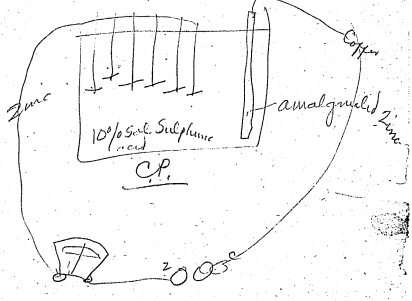
Solution for water Distilled
Water 10% of CP Hydrochloric Acid
Oil on top to prevent acid
Eating mylar -



Pneumatic

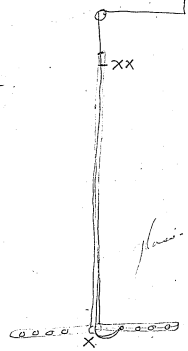
20/100 of ampere for each Electrode in the bath —

1 ampere 20/100 amp. one hour



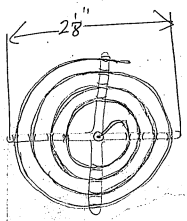
after taking out put in large [illegible] distilled water & soak for few hours stirring water finally rinse in distilled water.

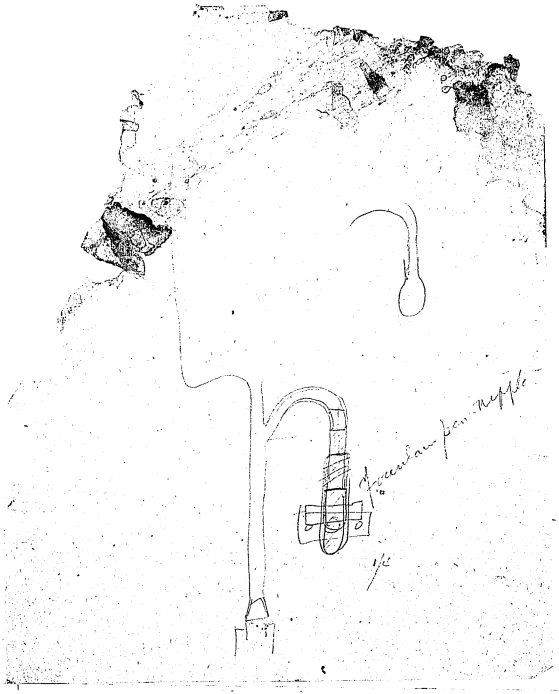
Det up one cell –

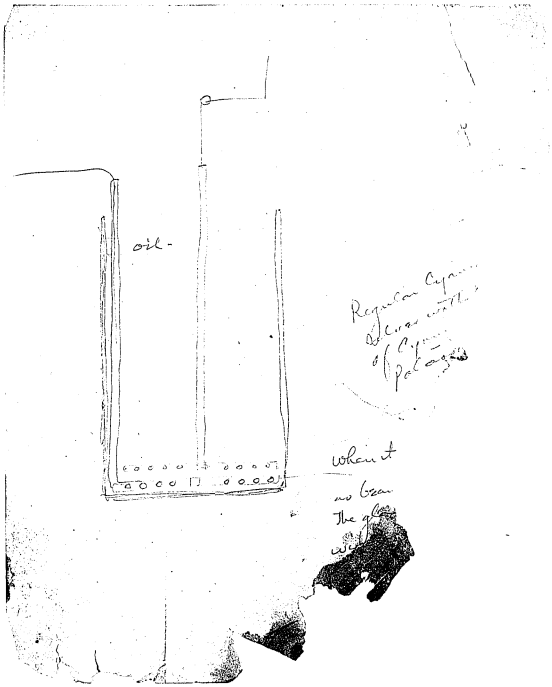


glass tube filled with paraffin from XX to X

1/32 dia




Jacobian pen nipple
1/2


oil -
Regular Cyan
Dear with
of Cyan
Pet cage
when it
no bran
The gl
wi

Marking Matrices

Phono-Roots

Young 1478 of 1894, coats with graphite and electroplates with "copper, nickel, precious or other suitable metal." Then backs up the matrix with "an outer cylindrical or other shaped case, of metal, or other material capable of maintaining the stability of the electro." Outer case may be cast on.

Lionet 23366 of 1893. Electroplates on a metallic master (soft steel) No special plated metal mentioned.

Edison 13693 of 1900 Vacuum deposit with gold. Also "gold-leaf or silver salts reduced by chemical reagents to the metallic state."

Edison 382419 May 8, 1888 Leaden matrix for stamping by vacuum deposit with silver or by electroplating with silver. "A thin coating is produced in this way, which is backed up by a coating of lead or tin, which is also quite thin. For example, it may be one-sixteenth of an inch in thickness. The silver gives an exceedingly smooth surface, which is better than gold or platinum."

Edison 484582 Vacuum deposit; gold leaf or silver salts chemically reduced; or graphite. No special vacuum deposit or electroplated metals referred to.

Edison 667662 Feb. 5, 1901. Vacuum deposit and electroplating. No special metals referred to.

Lambert 645920 Mch 20, 1900. Graphite-electroplated with copper.

G. H. Ohmes 650431 May 29. 1900

"To this end the first step in my process consists in electrically depositing upon and around the usual cylindrical wax record an electrolytic matrix or mold; first depositing a thin shell of nickel upon the wax and then depositing upon this a heavy shell of copper, the purpose of the nickel being to give to the interior face of the matrix a smooth surface that does not tarnish, that is harder than copper, and thus will produce a higher polish upon the surface of the phonogram or record that is afterwards pressed therein."

Old Nickel on graphite (Young)

Ditto with thicker coat of copper (Stevens)

Vacuous deposit of silver or electroplated silver (Edison)

New Vacuous deposit, nickel and copper

Vacuous deposit, silver and copper

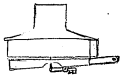
Vacuous deposit and nickel

Ditto and silver

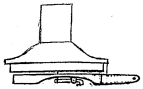
Unbound Notes and Drawings (1904)

This folder contains dated notes and drawings from 1904, as well as undated material possibly from the same year. Included are numerous undated items by Edison, John F. Ott, and others regarding the layout and machinery of the Edison Storage Battery Co. plant. These documents probably relate to the concrete factory building erected next to the West Orange laboratory in 1904. Also included are two drawings pertaining to phonographs.

All of the documents have been selected.



B.H.
Oct. 11/04.



B.H.
Oct. 12/04.

500 Cells Daily

(1)

Plating filling washing = screening, cleaning in Hydrogenin 500 cells daily.

2 = Rolling strip nickwide, from 3" strip 15/1000 to 3/1000 - Rolls furnace, Hydrogen plant for annealing -

3 = Plating the strip,

4 Annealing strip, Can stock = all other parts, furnace + Hydrogen generator

5 General plating dept to plate all the parts except strip -

(2)

6 = Tube forming = Hydrogen annealing + welding -

7 = filling tubes, assembling in grids, pressing in grids -

8 = Can machinery = tops, bottoms, Soldering tops, etc -

9 = Strip perforating

10 Cup making -

11 Iron filling cups assembling = in grids -

(3)

12 = Punching grids & other things
Hydraulic presses ✓

13 = [illegible] Can washing ✓

14 = Assembling Coils & washing — ✓

15 = Test room ✓

16 Store room ✓

17 Shipping dept ✓

18 Tool room — ✓

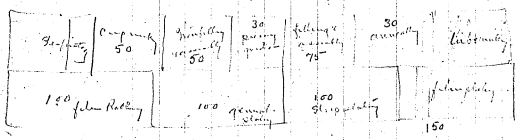
19 = Napha Cup washing ✓

(4)

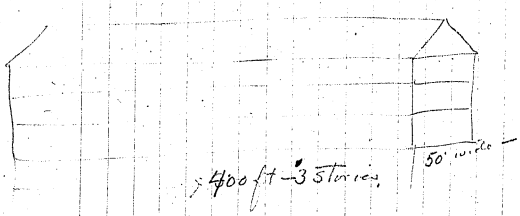
20 Dynamo Room

21 Coffee-Drying [illegible]

(6)



(6)

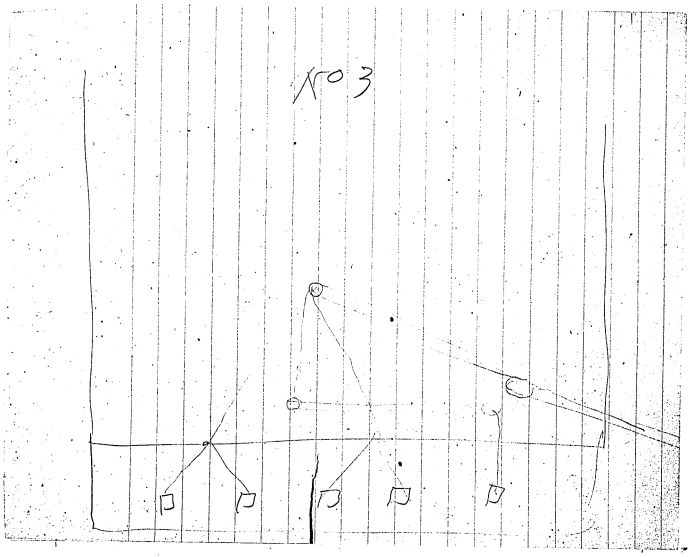


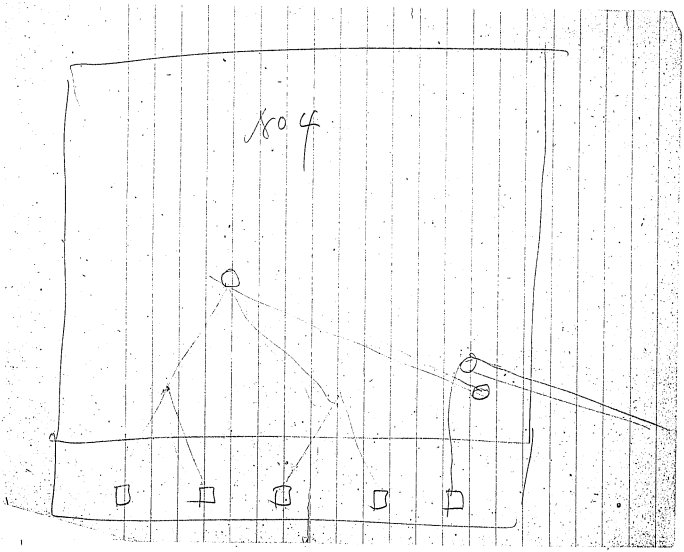
400 ft – 3 Stories

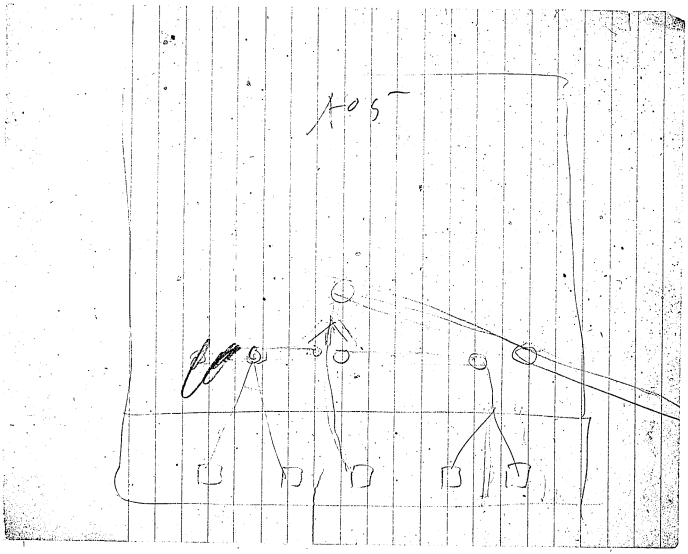
101

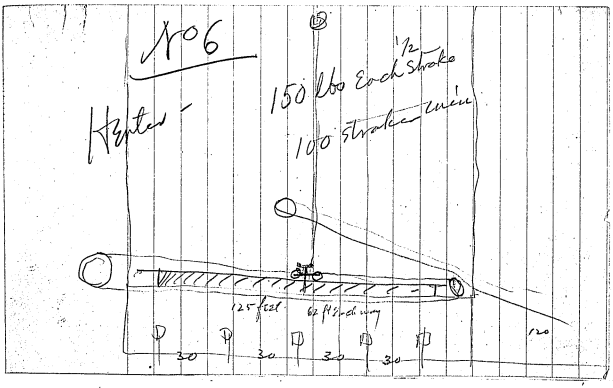
102

No 3

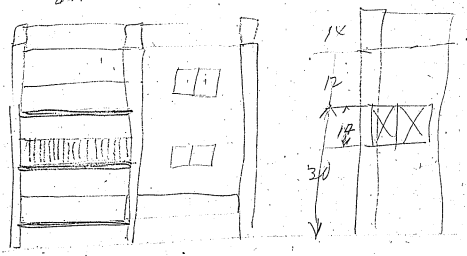



804


HOST


No 6
Heated -
150 lbs Each Stroke
100 Strokes min
125 feet
62 ft Stroke
30
30
30
30
120

c) 240.
61.

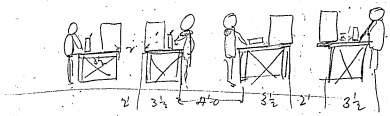


40- troughs, 6ft long — or 80 3ft or 160-2ft,
filled with assembled Ni grids — into
which is 1% Potassium Palladi Chloride
3 times, - Solution, 130 feet -
pipes — troughs thin sheet metal
resting on pipes — depth of trough
sufficient to cover grid 3" —
= 240 feet, Leaning

Strip - for Tubes.

Stock.
Rolling } includes annealing - #1.
Slitting
Perforating
Plating
Annealing
Tube making, ~~Washing and drying~~
Tube filling & inspecting. (oil cleaning)
assembling in grids and Hydraulic Press
making grids
grid plating
assembling in can body
Stock. Can Bodies
body forming - bending - lap and bottom press
can welding - side and bottom
Mounting of tops of cans.

Rolling —
Slitting —
Perforating
Plating
Annealing —
Inspecting —
Filling X Inspecting —
assembling in grids — and Hydraulic Pr.
assembling grids in can body.
Stand tops with dies — Welding
Second Machine — Welding cans



2 – Shears for cutting Stock. 6m 3 x 6. 6m 2 x 4

Press for seams. 3 x 5.

3 " " Corrugating Hydraulic. 3 x 5

3 Body Forming Machine – 3 x 3.

Can body

Stock.
Cut to length. and hole punched.
Plated.
Primed -
corrugated. s
Bend for seam pressed.
Body forming -
Body welding - sides and bottom.

Bottom, and Dep. pressed -
Top Mounting - includ. pressed and soldering -
Plating -

E18

500 Cells

3 5
17 5
3 5
52 5

Mi.

Drawing Tubes - (6×33) 5 Reg.
Cutting off Tubes
~~Lifting~~ Annealing Tubes 20 Hours
Filling Tubes (26×26) 40
Closing up Ends - 5 #1½ B. Fort Pm
Corrugated Tubes
Cutting in Ends - Hyd. (4)

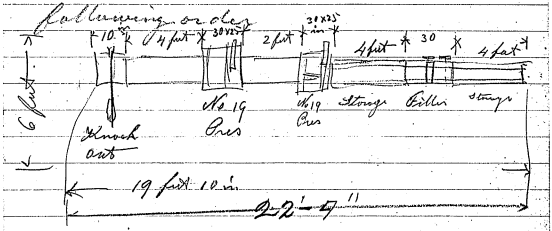
Ni Grids -
Dies for Grids - 10 - #B

20
60
12 07 p

3

01

Iron Pocket filling Tool No 19
Bliss Presses to be set up in the
following order



5 Set of these Machines required to
Make 72000 Pocket equal to 500 cells
of 12 plates

Nickle Pocket filling

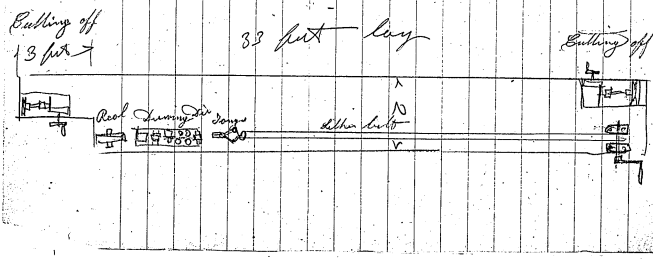
It will take 40 tubular filling Machines
To make 96000 tubular pockets
This amount is required to make 500 cells
a day, Machine filling 2600
Each machine requires 26X26 in bench
room, benches 36 in hight
Speed of counter shaft 120 Rev

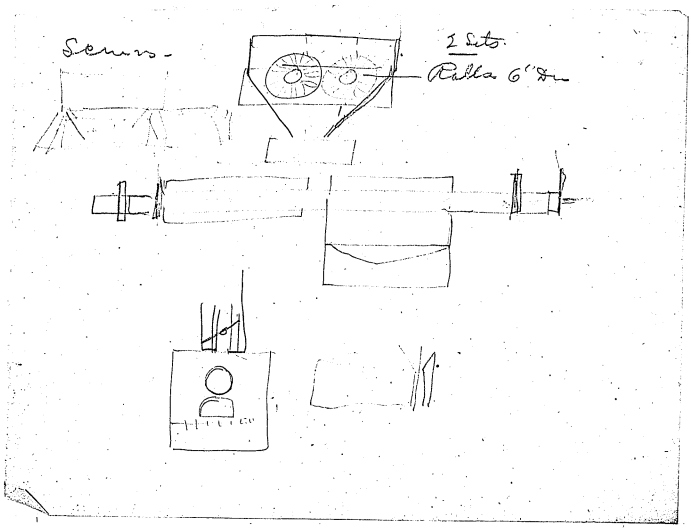
Draw Benches Five of these each
30 feet long

Machine for cutting tubes not
in 4 13/32 long it will take 10 Machines,
each requiring bench room long enough
To take in tubes 26 feet long, they
can be put on same bench as draw
bench, 3 feet high, thus

Closing end 5 foot Presses 1 1/2

F. Eng.


Cutting off
3 feet
33 feet long
Cutting off
Reel
Lowering Jib
Jonge
Other belt


Screws -
1 Set.
Rolls 6" Dia

96000 Tubes = 500 cells.

200 cells = 2/5 of 96000 = 38400 Tubes.

a tract 5 3/4 diam. would hold not 300.

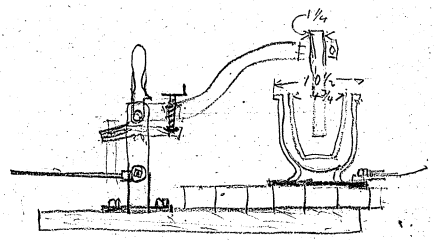
9" long = 600. 600) 38400 (64 Tubes.
3600
2400
2400

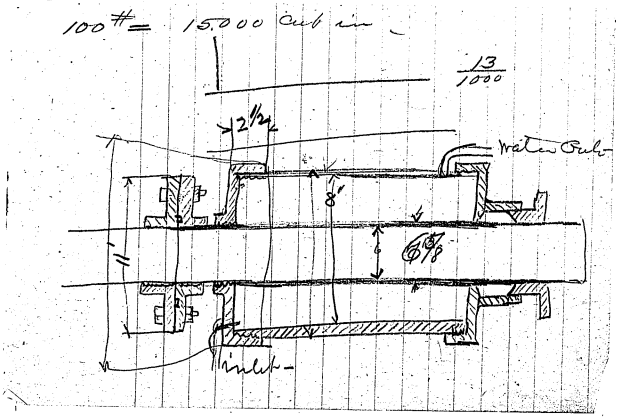
64 × 10
60) 640
10 Tubes. 4. Tube Furnace

144000 Pockets = 500 cells.

200 cells = 2/5 of 144000 = 57,600 Pockets.

40. 9604
88.1


1 1/4
10 1/2
1 3/4


100# = 15,000 cub in
13/1000
2 1/2
Water Cub
8"
6
Inlet

96000 = 500 cells.

200 cells = 2/5 of 96000 = 192000/5 = 38400

38400 tubes. 4½" long.

a tank. 5¾ dia in. would hold about.

300. - 9" long = 600

288
300
172800 %

600) 38400 (64 = say 60 tubes) 172800 / 57600

36000
2400

64) 700 (11 2 furn =

6

~~5 furnace~~

5 tube furnace — or 3 furnace 22 tubes in each.

300.

144000

20 48
288
67600

17 7200
172800
57600 Products.

2.76
12
552
276
33.12) 9.0000 0
6624
23760
23184
57.60

.271

180.#
811600
271) 186600 (100
1720
1380
453.5925

28.30
16
77010
28300
453.60

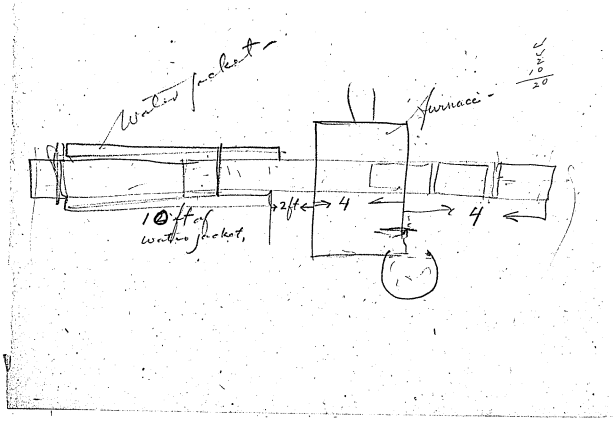
16000 oz.

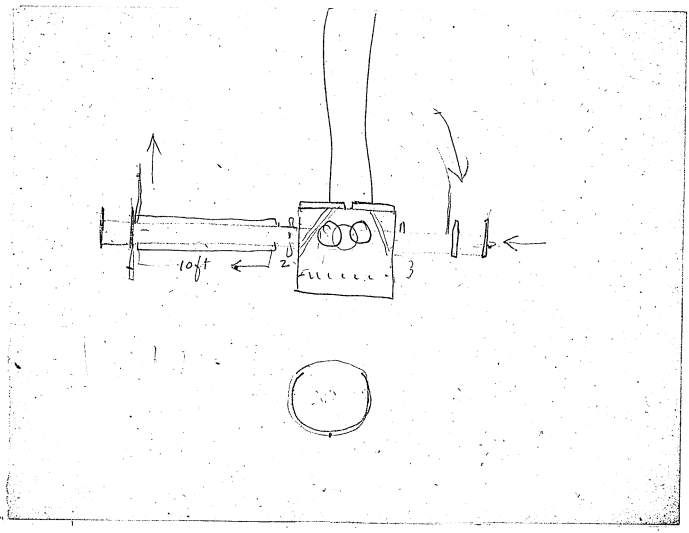
25.96
12
5192
2596
311.52
.271
31152
21806.4
62304
84.4219 2 grams.

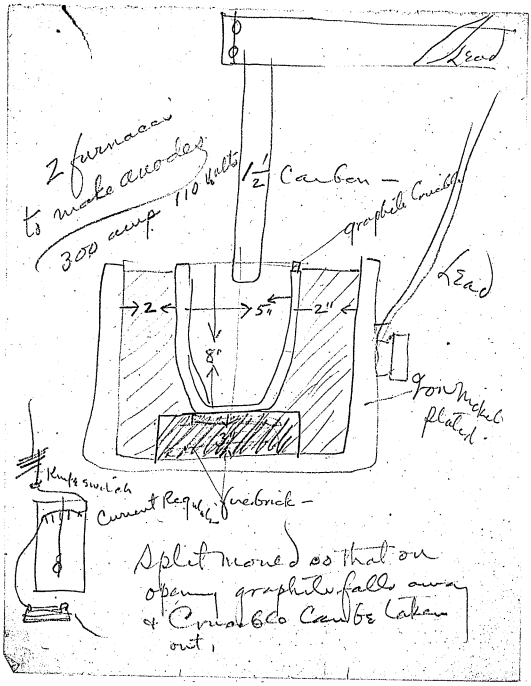
8442) 453.600 (5.4
42210
31500

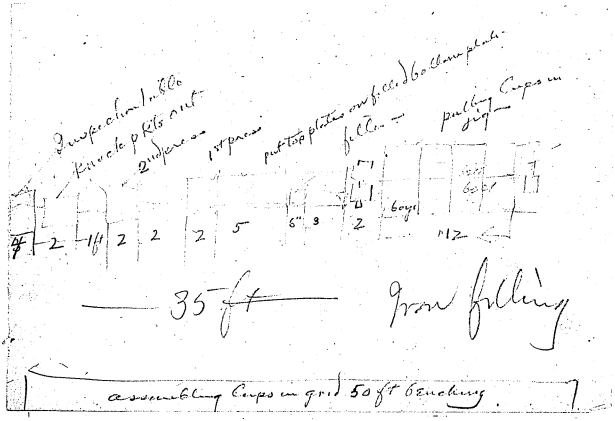
10. 6.254 lb.

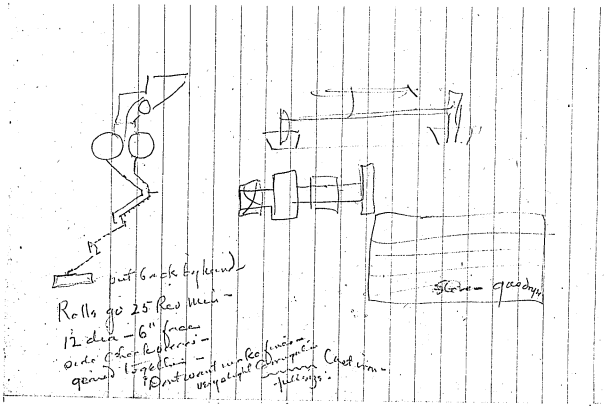
600
2½
1200
300
60) 1500 (6
25.4
6.25


Furnace
2ft
4
4
10 ft of
water jacket,

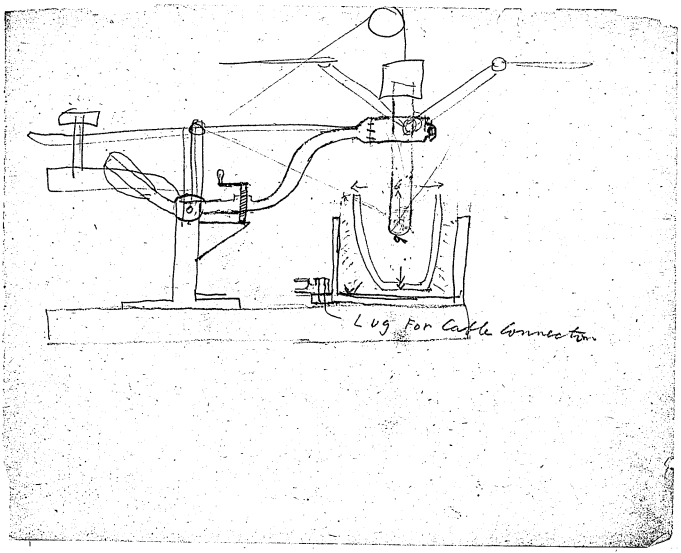

10ft
2
3

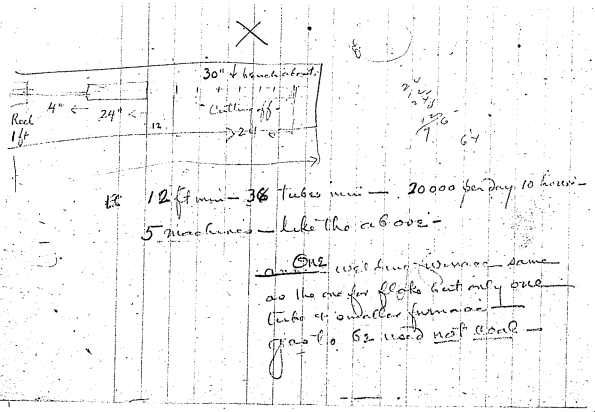

Lead
2 furnaces
to make anodes
300 amp 110 volts
1/2" Carbon
graphite Crucible
Lead
2"
5"
2"
8"
Iron Nickel plated.
Knife switch
Current Regulator
fire brick
Split mould so that on opening graphite falls away & Cmax 660 Carbs taken out.

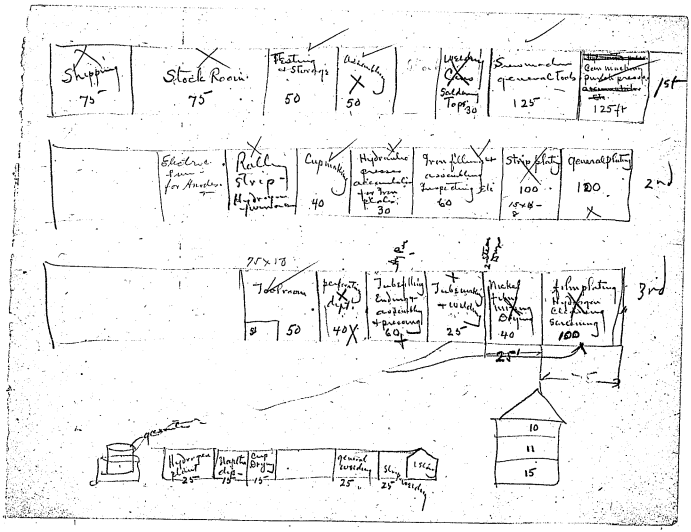

Inspection in 8lbs
fitments p Kits and
2 men on
1st press
put top plates on feed bottom plate
feller
putting Caps on
jig
4 2 1ft 2 2 2 5 6" 3 2 6 boys 6 boys 12
35 ft
from filling
assembling Caps on grid 50 ft bending


Rolls go 25 Rev min -
12 diam - 6" face
Stone - grooves

Dept to Receive the green nickel from
Chem works 1/4 of finer mesh —
Crushing with rolls, screening -
~~[illegible]~~ to 20 mesh & finer —
& mixing flake with it by using
one of the mixers now in Slow
Lake substituting light fuller's
& flence of the heavy to Rock
Dept not to Crush stuff -
& Dryer to Dry the mix —


Lug for Cable Connection


30" + bench board
Cutting off
Reel lift
4"
24"
12
24
12 ft min — 36 tubes min — 20000 per day 10 hours —
5 machines — like the above —
One washing machine same
as the one for flake but only one
tube or smaller furnace
giving 6 to 8 cord next week —


Shipping
75
Stock Room
75
Plating & Strip Tops
50
Assembly
50
Weighing
Solder Tops
30
Small machine & general tools
125
Comm machine products & general
125 ft
1st
Electric furn for Anodes
Rail Strip
Hydraulic furnace
40
Cupriding
Hydraulic press & assembly
30
Iron filling & assembly
Inspecting Eli
60
Strip plating
100
15 x 8
General plating
100
2nd
Tool room
50
Perforating
40
Tube filling & assembly & processing
60
Tube work & welding
25
Nickel tube plating
40
Film plating & Hydrogen Electrolysis & screening
100
3rd
10
11
15
Hydrogen plant
25
Magnetic clip
15
Bing Bing
15
General welding
25
Sh
25
Welding
Stock

[ON BACK OF PRECEDING PAGE]

strip for — 5×8

Lead Mill — 6 & 3

4×30

Screw Mill and Drill

Press

Plating & Tank

3×12

Welding Cars

£18 150 Sides - 10 lw

Top £ 75-80 -

Bottom. 80-90. —

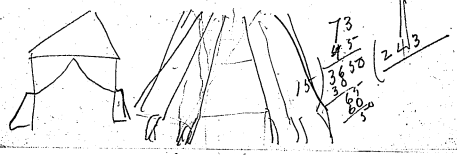
X others same proportions accord to dist. are welded —

Base £ all on £18 —

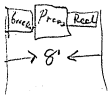
5 - Side welders —

X 6 Top welders — for 10-ton

6 Bottom welders —



5 Cupmaking Machines -



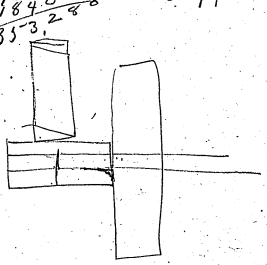
144 —
21 00
144 00
288
302 400

302 grams for Fe & 18 —
353 " Ni "
655 Total.
734 — 800.

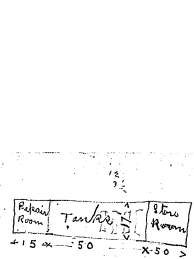
655
500
446 | 3275 00
3122
1538
1338
192

734

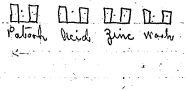
1840 —
192
3680
16560
18400
353.



375
42
750
75
8250
2 u
16500 again
5
82.5 wk in
5
16 | 412.5
25 Use per cycle per rack



2.5 min per cycle = 11 lb per min per rack
with two racks one is in use all the time
necessitating 2 tanks for acid 1 for dip
one for wash one for cobalt one
for zinc one for potash
tanks are in pairs or double
3'-6" c-c - 1-6½ wide by 13 long
outside space necessary 50 x 13

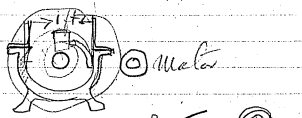


17½
32
15½
1½
47

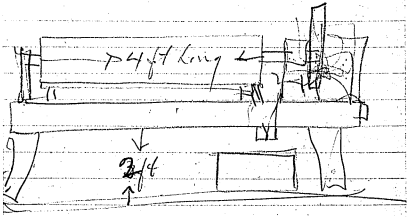
120 1.44

lift out ring to clean -

plow + smoother -



20 Rev



Stand 31 lbs -

Pulley - 26½ "

Dust Ring - 1 "

Scrap 1

Σ - 9½ lbs -

filling Machine 20 minutes, one cell —
3 hours — 30 day — 500 daily 16 machines —
space on bench — 24 inches —
Gauging & reassembling before & after filling —
space on bench 8 places 24" each —

Ending Machines — 20 complete per minute,
10 minutes, per cell, 60 cells 10 hours, 8 machines
24" inches length bench for each —

Assembling 40 per minute, 4 places —
30 long on bench =

Hydraulic pressing of cells in
grid — 6 plates per min — or one cell —
or one hydraulic — These can go in the
tube filling Room —

Length of tube filling tube 45 feet.
2 tables, 500 daily —
Benches outside of this length is plenty
for assembling —

Corrugating tubes

4X4

20 pennies - - 6 inches

600)4500(7

20)90000(4500
80
100

Each perforating machine — 10 feet long
7 ft bellows — Extend outwards towards
Center of bldg from the beach —
38,000 ft required daily Each machine
do 20 — pay 50

Rolling thin strip from 3" 15/1000 —
38000 ft .003 daily 24 hours, 1 machine
opt dila from the body for No of
Rolls furnace length of room —
Etc — 14 Rolls — 2 furnaces

50 wide — 60 long.

12" bucket, 150 buckets per min ultimate

#103 chain ~~[illegible]~~ 300 1/2" bcs 1/4 ft

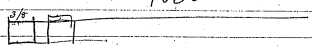
Screen — sloce bake

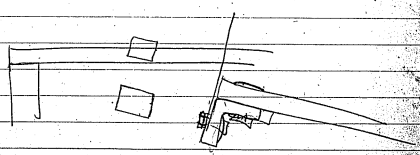
150 — 1500 — 7500 — 15000 — 225000 — 1728 — 1728 — 5184 — 5.1

13. 13 — 50 — 650 — 6500 — 39000 — 2000 — 19000 — 19 — 19 — 2 — 38 — 9 — 47

2000

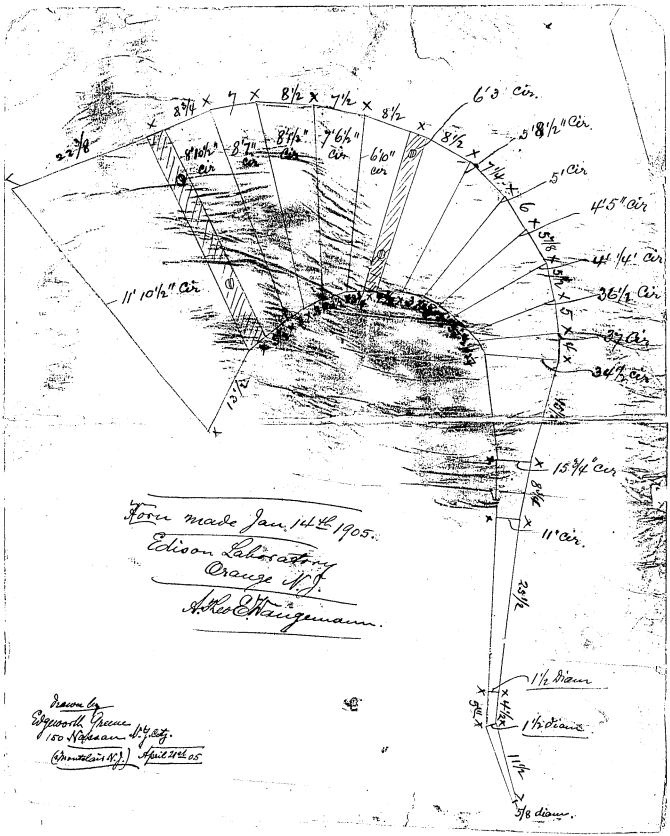
48000





Unbound Notes and Drawings (1905)

This folder contains one drawing of a phonograph horn. The horn was constructed by Adelburt Theo E. Wangemann and drawn by Edgeworth Greene.



Form made Jan. 14th 1905.
Edison Laboratory
Orange N.J.
Alfred E. Hargemann.

Drawn by
Edgewoth Greene
150 Nassau St. N.Y. City.
(Montclair N.J.) April 24th 05

Unbound Notes and Drawings (1906)

This folder contains 2 pages of notes and drawings, probably by Edison, regarding phonographs. They were witnessed by John F. Ott in December 1906.

Both items have been selected.

December 26/06
J. F. Pitt

002

3000

1000 CM

002

003

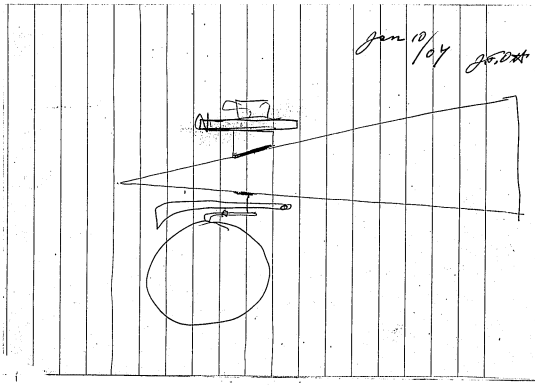
Dec 26/06
J. F. Pitt

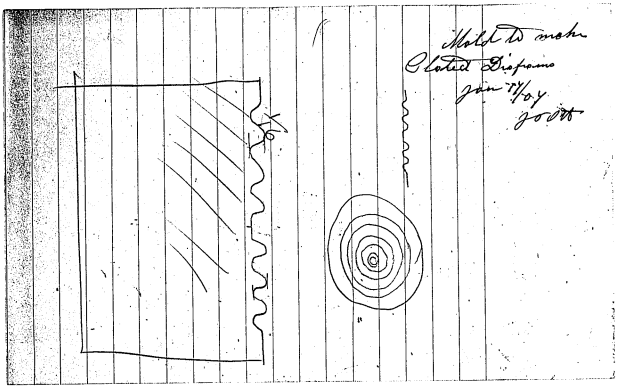
1

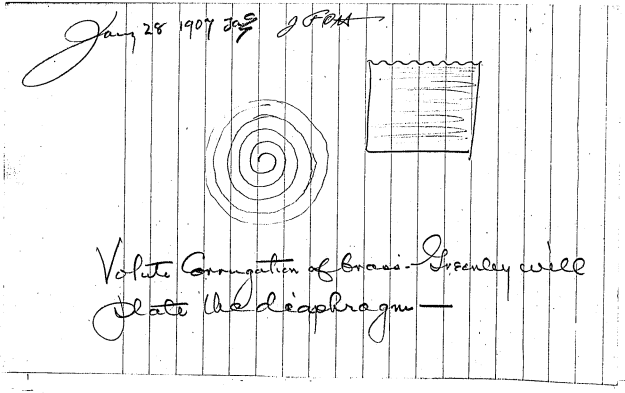
Unbound Notes and Drawings (1907)

This folder contains dated notes and drawings from 1907, as well as undated material possibly from the same year. Included are numerous notes from Edison to John F. Ott pertaining to storage batteries, phonographs, telephone devices, electric vehicles, and other matters. These items were probably written at Edison's winter home in Fort Myers, Florida, and then forwarded to the laboratory in West Orange. Also included are notes and drawings by Edison and Albert F. Wurth regarding Edison's kinetophone and various notes, memoranda, and calculations by Ott.

Approximately 80 percent of the documents have been selected. The unselected items consist of a manufacturing drawing for the Edison Phonograph Works and most of the material by Ott.

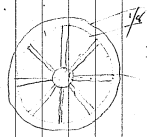

Jan 10/04


Model to make
Corrugated Diaphragm
Jan 27/07
J O Fox

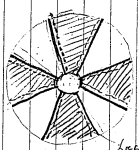

Jany 28 1907 Jas J O Fox
Volute Corrugation of brass - Greenley will
plate the diaphragm —

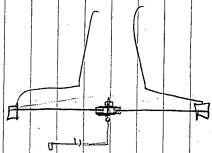
X03

July 28 1907 [illegible]



July 28 1907 [illegible]





Lap 15/1000 – Wear 2½ to 3/1000 steel –
get them flat – if can't get steel flat make
hard Copper .003 or aluminum 5/1000 –

X04

Jolmott

John Cantuse any larger dump than at present the larger ones don't give the results, - How close have you got the flake to dump kerry

March 25/07 E

up the Cans for Walter Archer

Mr Edison

We have the loading machine to work as close as we can make it, the following is the result

100 Dumps of Gun Nickle

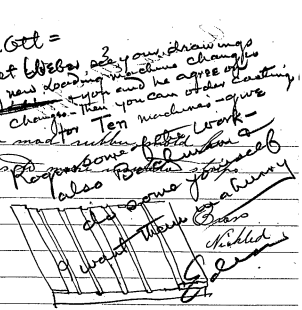
2390	2435	2460	2465	2410	2460	2460	2420			
2385	2400	2420	2405	2395	2395	2305	2310			
2400	2440	2500	2460	2410	2380	2330	2365			

10 Dumps of Gun Nickle

231	245	250	248	255	250	240	240			
240	250	250	260	252	250	246	244			
238	250	262	268	255	250	250	235			
245	240	252	250	255	248	254	244			
228	232	255	254	248	240	241	244			
225	238	260	256	240	250	245	246			

John Ott =

Let Webber see your drawings of new loading machine changes ~~[illegible]~~ and he agree on changes - then you can order castings. also mad for Ten machines - give Rogers ~~[illegible]~~ some work - also some work when I Rogers ~~[illegible]~~ also some forgings



The Rubber workers put the rubber in the tray and it with a roller to push out all the air then put on a flat plate then ~~[illegible]~~ rad, Yesterday

The loading machine is in good condition it works well do you want me to order the castings for another lot and have money? Yours truly

Jos. Ott

[ON BACK OF PRECEDING PAGE]

Received Ofrs 9/07

John Ott –

We are troubled with Grape fruit & I will send you a box so I will not worry so much about it, Hurry Cells to Walter Archer

C

I am held up for Cells (12)

Cans

I want 2 Cans for each grape fruit

Talinette =

I think the flake either falls faster than the green or the opposite if this is so, then we must arrange the dumping so that ~~one~~ the slow falling one goes in first, then they will reach the bottom both thoroughly mixed — something of the character to what you could change (or the cracker single machine) he could make 3 or 4 groups of best cells each with a different timing of the green keeping flake constant & thus you could find by tests which gave best capacity wing of course the same green

Edison

[POSTMARKS: MARCH 30, 1907 (FLORIDA); APRIL 2, 1907 (NEW JERSEY)]

Johnson —

There is another bug in the long tube which we must try and get around — If we dump flake and green at same time & they mixed & travelled to bottom of tube at same rate we should of course be OK — but if they fall at different rates which I am sure they do, then the longer the tube the more they will separate in distinct layers at the bottom, and then as we approach the top they will commence to mix and light near the top they will be OK & not in layers

If you can arrange the machine to vary the time as the tubes gradually fill up we should have to make one change at least in dumping — Have 1/2 the tube loaded one way of dumping " " " " then a change in the dumping times to start a fresh on the other 1/2. This we should have only 2 make where it gradually operates inside of 4 inches.

You should study out this not good too much on new machines —

Edison

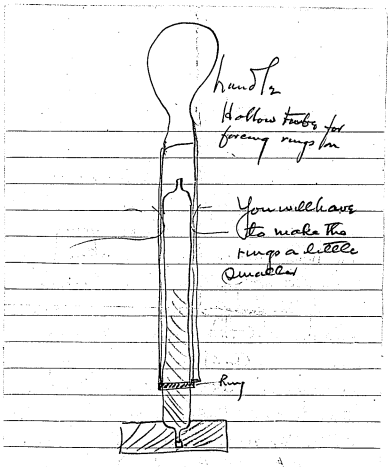
John Ott
Edisons Laboratory
Orange
N Jersey

John Ott -

I notice in tests that there is a little swelling up pockets on account of the rings not going on tight enough. Evidently when taken out of packing tube there is a slight opening to tube & this makes bad contact with sides please see if you can make Walter Archer a little holder & showing tool to hold tubes upright & above the rings on light the pressure being taken by Rounded Ends to tube,

OVER

[ON BACK OF PRECEDING PAGE]



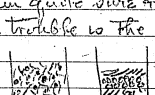
Edison

I will write Walker & tell him to make a test group to cells holes
You get up something for him —
E

(1)

John Ott =

As near as I can figure out the reason of long tubes packed in big machine have poor capacity per gram of green nickel is before you have not exactly imitated the dumping of the little machine, and the green is not distributed or well mixed with the flake but is in layers — a slight change in the dumping made great difference in the little machine — with the same mix old short tubes give 236 milamperes hours per gram of green when on same green in long tubes only give 174 milampere hours I can quite sure & almost positive the trouble is the dumping



Edison

John Ott =

(2)

Another reason why long tubes have poor capacity per gram is due to not mixing flake with green properly is shown by the tests — When a tube is loaded with the flake & green well mixed the flake being nickel. The first charge is about the best the 2nd 3rd etc does not improve the capacity but when you dump the flake in & then the green the 1st run is low & every run improves it up to 5 or 6 runs — This is because the green is so far from the flake that it takes time to penetrate & make it conducting so there is very little doubt but the dumping is such that the flake & green do not get as well mixed as in the little machine

John OCC = 3

I should say that the green + flake should start to dump at the same time and to take as long a time as the movements of the machine will permit + not come up + dump all at once. also when the flake is through dumping the green should finish dumping at exactly the same time as the flake + not before or after =

Edison

The machine does this exactly and cannot be made to do otherwise. There is not a hair's breadth diff in time of dump between large and small machine, and as for even feed it beats the small machine, that does not feed even the flake same times

John 4 John Ott -

You have not understood my letters at all. Read them more carefully E

I have just come across another proof that the trouble about flack of capacity is in the dumping

We have two qualities of green one gives in Regular tubes 200 milamp hours per gramme — the other quality gives about 230 milamperes

Now one set of long tubes containing the 200 milamperes green gave nearly that 191 but the other set of tubes having the 230 milamp green only gave 185 ~~milamps of~~ a better stuff ~~but~~ This green is more bulky & you had to make a new square dump cup — now we drop this you made it do it dumped wrong. ask Conlin tell him Reg green dumped ~~fair~~ but Jamaica not filtered low heat green dumped wrong

OVER

[ON BACK OF PRECEDING PAGE]

Takes only half load. The hopper becomes clogged and Walter has to stop flicker up to broke working, the cause comes across in big machine

you can then see what change you made which made the good green work than Regular

E

We found the diff in density and we made a set of slides for each grain so that we dumped 24 lbs Grams for dump, to prove that we were correct we filled the green hopper only and made 10 dumps then weighed it divided by 10 and 24 would come out each time within a small fraction, the green comes all mixed, as you can't expect — To take exactly 24 in each dump. It will be 24 then 23 then 25, but will even up.

[POSTMARKS: APRIL 10, 1907 (FLORIDA); APRIL 13, 1907 (NEW JERSEY)]

Johnott

we can ~~with~~ light our tramp
or get an increase in battery by
using the present tramp —

Yours truly
J. F. Ott

John the capacity and life
depend upon Contacts — a 3
lb weight does not give the
life or the Capacity of a 3½
lb weight — the new machines
should be at least 3½ lb weight

Also double tamps increase
the life & give 15 to 20% more
Capacity than single tamps

Sections of 10 plate & 20 plate
from now ~~[illegible]~~ but first sure —
10 plate 24 greenwell gives 6 cathodes

John Ott
Edison Laboratory
Orange
N. Jersey

[POSTMARKS: APRIL 13, 1907 (FLORIDA); APRIL 15, 1907 (NEW JERSEY)]

John Ott

John Ott = I notice long tubes made in the machine do not give increased capacity in proportion to their length and fall far below the capacity per gram = did they have double Tamps = if so then the rings are too loose or the weight too light The weight should be 3 ½ lbs & the rings go on tight = Did you make that tube tool for Walter so he could put rings on tight = as there is more elasticity to cushion the blow perhaps the height of the drop should increase gradually as the tube gets fuller – I don't suppose this can be done therefore we will probably have to use 3.75 to 4 lbs weight on the new machines – You should provide for place to add weight should we require it in the future

E

John Ott
Edison Laboratory
Orange
N Jersey

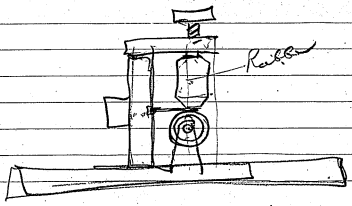
APR 19 1907 APR 19 1907

SEMINOLE LODGE
FORT MYERS, FLORIDA

Hooper – Better hours 5717 to 5737 assembled with worm on 4 circles – see John Ott about it – then turn them on board 2 or 3 times + put them on hat rack

9

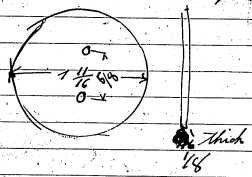
May 4/04 J.O.P.H.



Model call Nickle and Iron

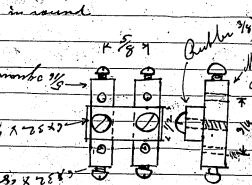
May 22/04 J.O.P.H.

Make Rubber top thus

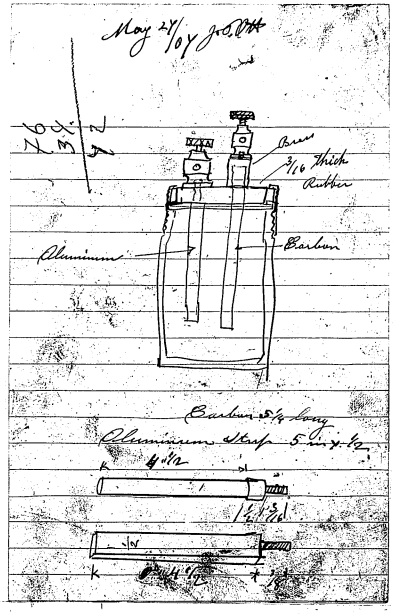


Cut out screw cover

1 1/4 in round

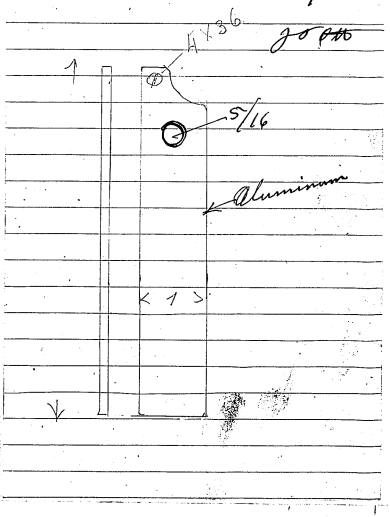


May 27/07 Jos Pitt



June 3/07

Jos Pitt

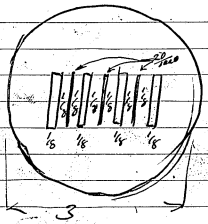


Antrifyer June 3/07

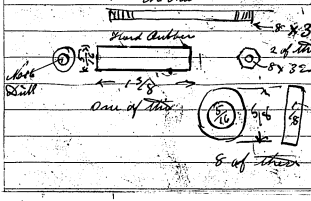
J.O.H.

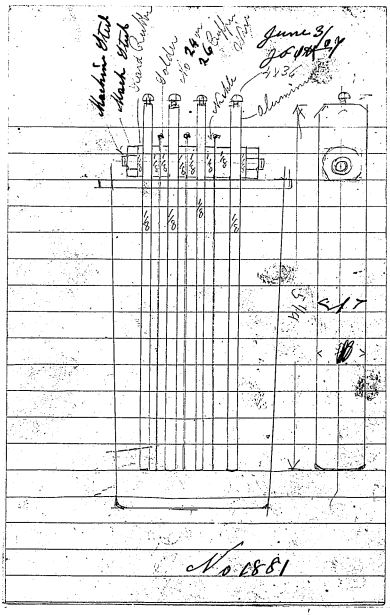
Hard Rubber cover 3/16 thick

3 in round



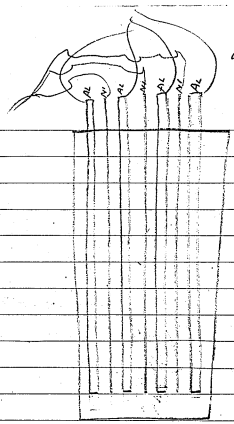
M Steel one of this





June 3/04

J. G. Pitt

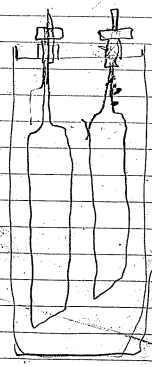


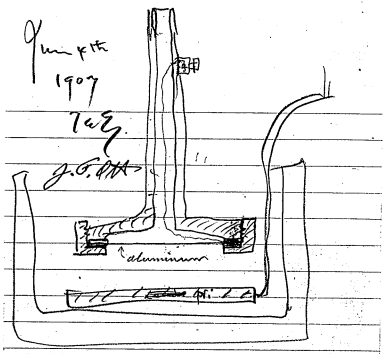
Strips 1" wide
Reaching to within 1/2" of
bottom of cell.
Jan 1881.

June 3/04

J. G. Pitt

John makes 1/2 doz Cells with
Rubber top. + only C P Ni strips
no iron used



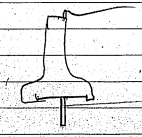


No 1919

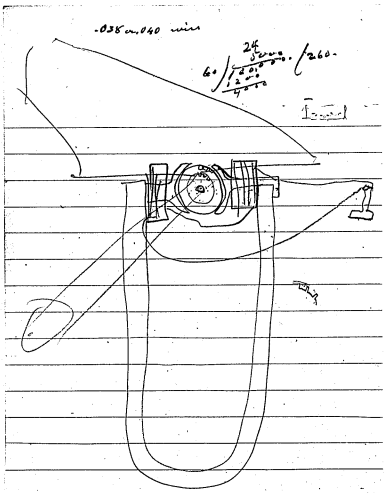
June 5/07

Aluminum diaphragm doesn't work

Change this —



Shellacd heavy all over the cone
except on the end



June 5/07

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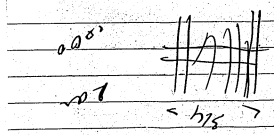
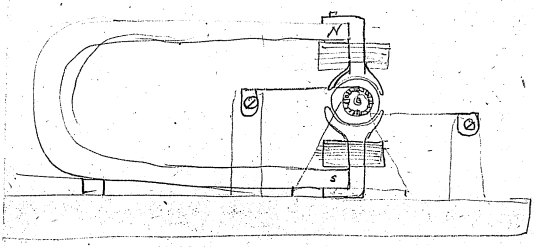
10 x 40 Shaft diam 0.192
Shaft " 0.125
Thus do the



June 5/04

Same as Phonoplex J. E. Watt



Armature 1/2 X 12 - 24 Silver Commutator -
5000 Per minute. Driven by Linen Thread -
from Phonograph Clockwork - Spools wound same
wire as on Phonoplex - Notched armature of punched
disks - No 40 Twisted silk
Covered wire double covered) -
Armature Edges off + dulled
before winding - or dipped in
Thin Celluloid dope -

Shaft 1/4 long 1/32 dia at
Bearings -

Telephone Repeater June 6/07

J.C.Off

Commutator — Slot with $\frac{10}{1000}$ Lower

450
314
1000
250
750
30) 78500 | 21,8
22
65
30
750
285
20

314
500
30) 15700 | 43,61
144
130
108
220
216
40

Armature

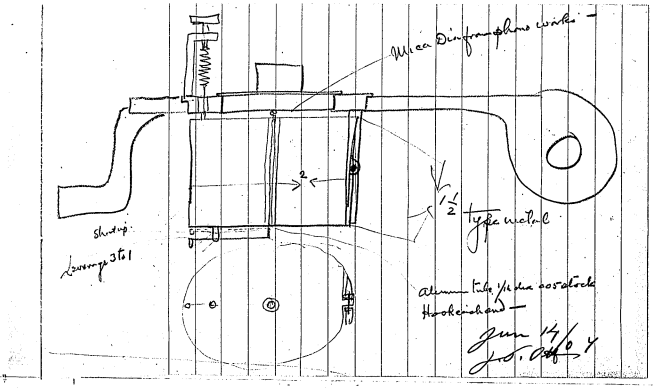
Slot with $\frac{40}{1000}$ Cutter

450
314
5000
500
2250
36) 22550 | 25,41
22550 | 25
216 | 40,41
1950
1800
150
144
60

47) 40,5
35
per ⅛

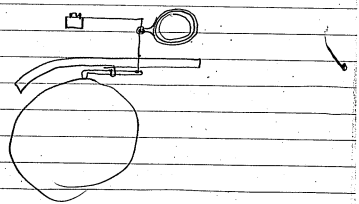
36
50
1,800

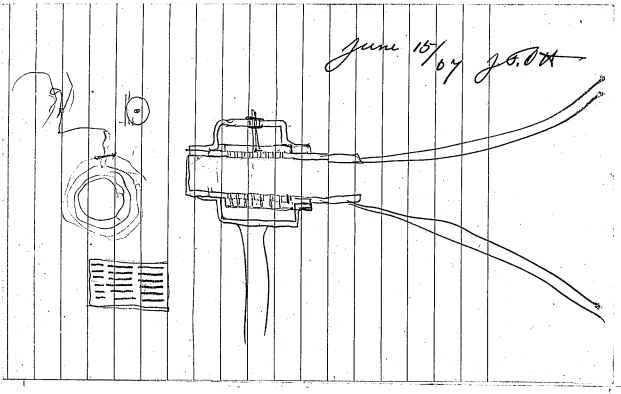
Turns 5 layers 4 # 20 turns each and two coils in each slot — 40 turns in each

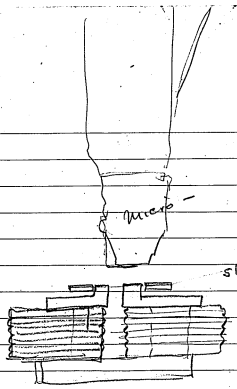

Mica Diaphragm
2
1/2
type metal
Shutter
Lever
aluminum tube
Hardwood

June 15/04 J. T. Ott

Loud talking reproducer by air pressure, or balance valve

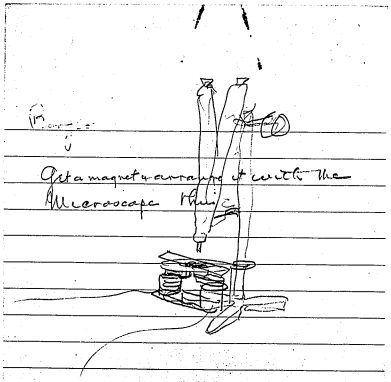



June 15/07 J.S.D.H



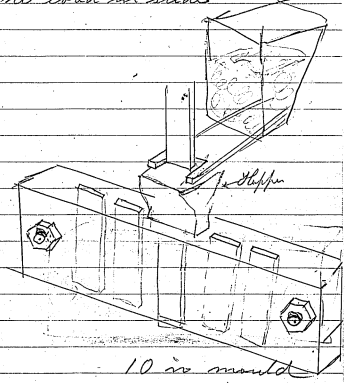
Attachment to Microscope to crystalize in the magnetic field

June 17/04 J.E. Hill



Get a magnet & arrange it with the Microscope thus

This will work all right ~~lamp~~ to knock out the load in slide



10 in mould

June 19/64 JOOA

36 - Divs
18 Cos

36 -

48) 750 (16
3
48) 2250
192
3
3

36) 2250 (62 -
216
9

24) 2250 (93 -
216
9

2

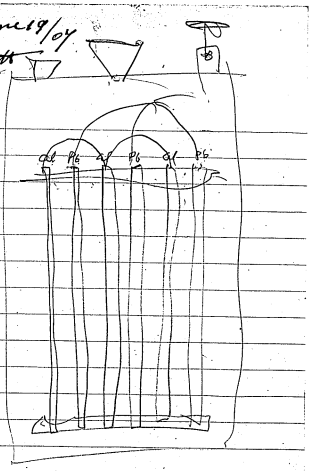
36 - Divisions

500
24) 1200 (25
120
80
48
40
120
120

2/40/65
35

June 19/04

20 oth



Rectifier 2 mm Quartz

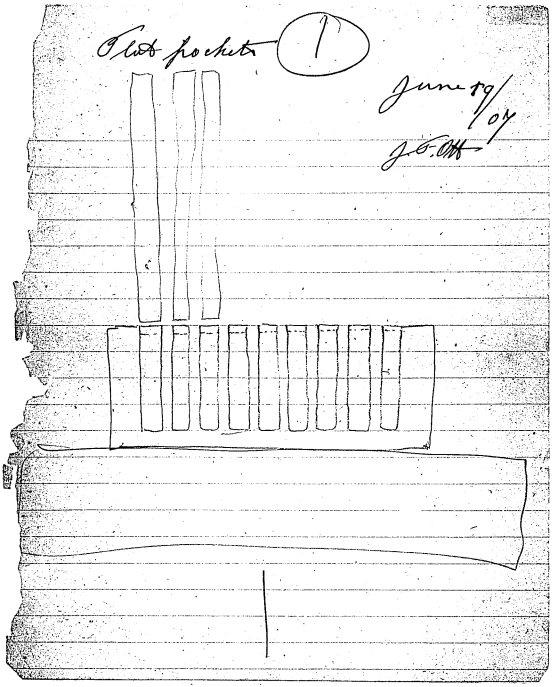
2 1/2 wide 4" long

1/16 thick

Cloth pockets (1)

June 19/04

J. F. Orr

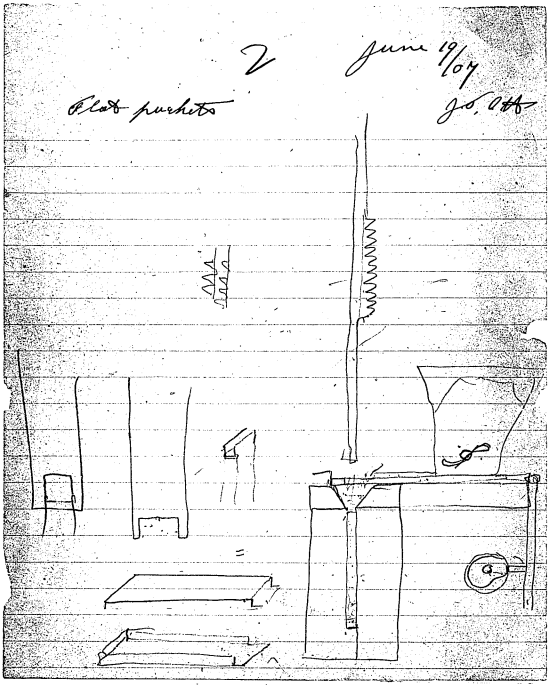


2

June 19/07

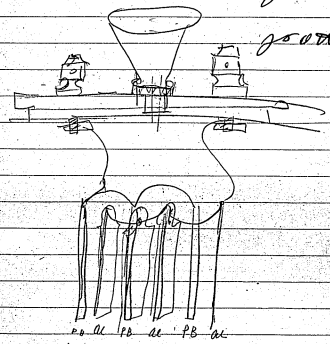
Flat pockets

J.S. Pat



Rectifyer

June 28
1904



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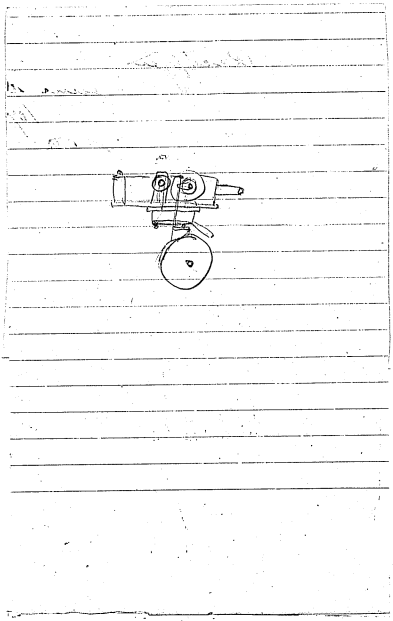
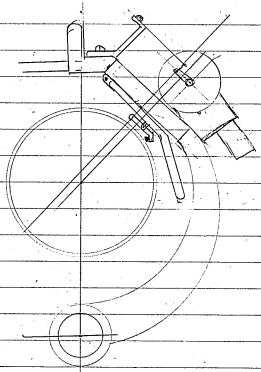
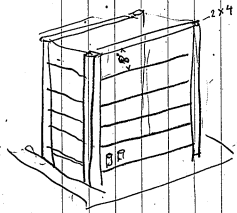
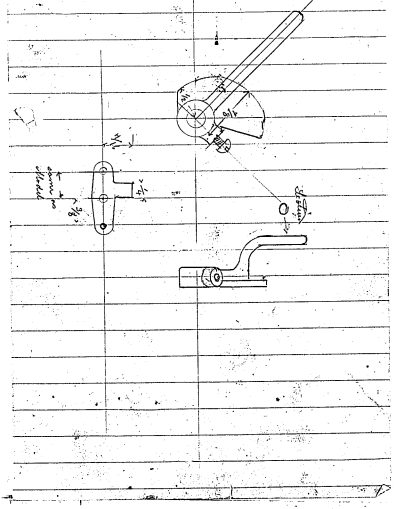


June 21 / 07

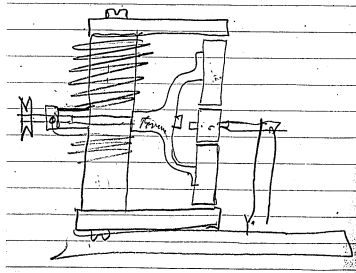




Cam lever for shaving off machine June 22/04 J.S.O'H

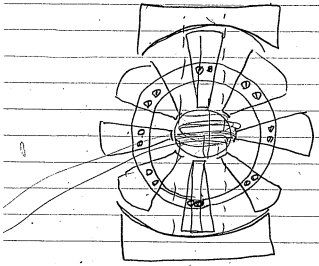


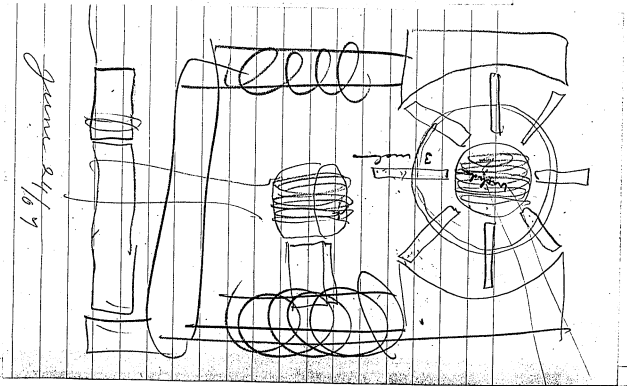
June 24/04. J.S. O'H

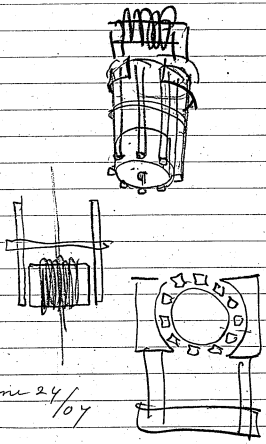


June 24/07

JOBA





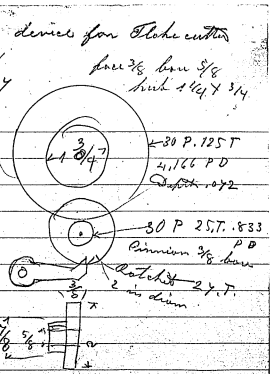


June 24/07

Feed device for flake cutter

June 24/07

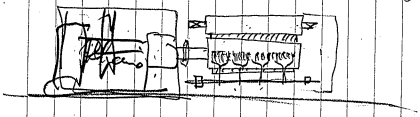
go off



Call 1/4 in throw

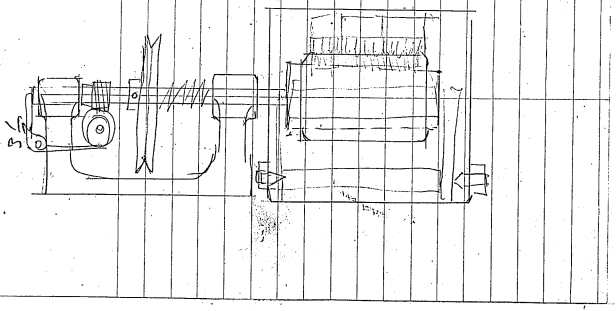
3/20 = 0.15
7166
57
999
233
166
167

Graphiting Mortar needs
to make moulds July 1/07
J. O. Bitt

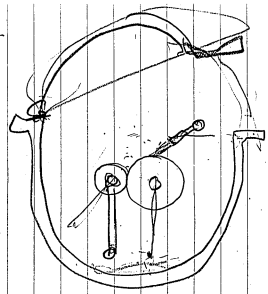


1941

Graphiting mortar needs to make moulds July 1/07
J. O. Bitt



Smokeless powder
recorder & smoke
recorder July 1/07
J. O. Ott

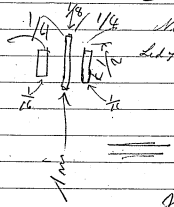


7-

Aluminum Rectifier

5 in high 1/4 in from
top and bottom of jar
and 1 in

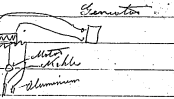
Aluminum 1/2 X 1/16



Nickle 30/1000
Lead & Antimony 1/8 thick

July 5/07
J. O. Ott

Connections



Sept 17 1907

Wurth -

Make experiment, connect Kinetograph to phonograph by a shaft of focal length of Kineto brain. Run the Kineto by a motor which is accurately governed then the phono being positively connected by the shaft will be in unison.

The shaft should have no torsion hence use 2" tube & good bearings.

A fly wheel quite heavy should be used on the Kinetograph

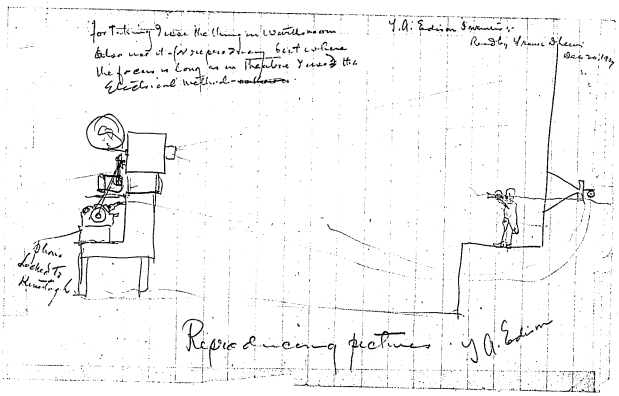
Edison

Projection
24 ft. Durchm.
20 ft.
Photographing
Water-table

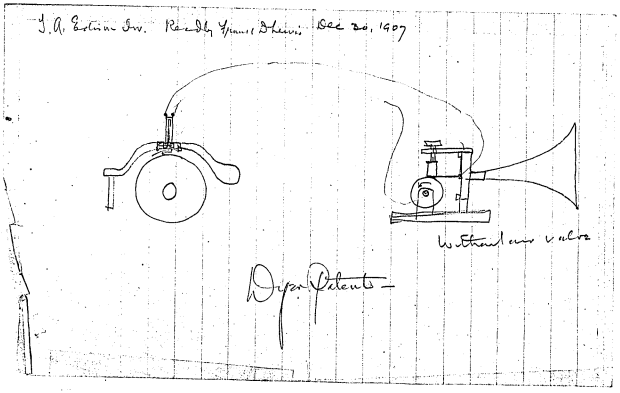
30'
32'

[ON BACK OF PRECEDING PAGE]

D
1907 M.P. - Gen.

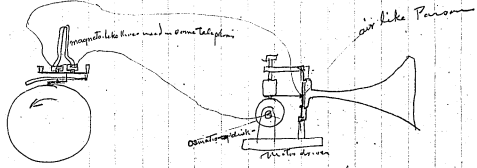

For Talking & seeing the Phonograph in a Waiting room
Color not at all necessary but would
the frame as long as in the picture & use the
Electrical method
T.A. Edison Inventor
Reading, Pennsylvania
Dec 30, 1907
Reproducing pictures. T.A. Edison

D
1907 M.P.-Gen.


T. A. Edison Inv. Recd by Simms & Stevens Dec 20, 1907
Westinghouse valve
Disp. Patents

T. A. Edison - Inventor

Received by Frank Dyer Dec 20, 1907



[ON BACK OF PRECEDING PAGE]

The sounds of the record – The apparatus is more particularly applicable to the production of moving pictures which are thereby caused to speak – a result as therein specified in addition of another application – Etc –

John O'C —

Help Halland on his dry Gallery Experiments —

Help Pearman to get a practical Vacuum apparatus —

Help Cosby in anything he wants for his Experiments —

Finish the Loading Machine —

Do anything that ~~test~~ man upstairs wants for the new test cells we have just made —

John Ott -

After you find out from Fred Ott

The best way of putting green in tubes - The best kind of holder for holding the small bits of plant & green - then go on board & change the Big Machine -

Do anything Newton wants to help along the Battery works across the Yard -

2

(1)

1st. make 20 cells of 15 plates each complete, or test in Baker Automobile —

The Nickel for this battery is to be made by Aylsworth, the proportions are to be 7 parts of nickel to 3 of purified Graphite also furnished by Aylsworth — The Nickel is to be run through the little pair of rolls six or eight times providing after each pass to break the flakes up — This grinds it very fine. I have made some today using considerable pressure, The flakes after wetting well & mixed with graphite rolled out easily & so fine that no nickel could be detected by the microscope on the graphite — as it would be a rather tedious job to crush enough with these little rolls — I suggest that the fine

rolls now used by Balantine. be taken apart & cleaned with Benzine - The rolls ground true in Universal grinder. Everything must be got very clean as the rolls will have to be put in a wooden pan & any dirt from burring ~~way~~ way go in the pans - look out for dirty driving belt arrange feed so that it feeds evenly - Better powder the nickel up to go through a 40 mesh before passing rolls - I suggest a small roller feed be used ~~[illegible]~~ the pressure should be enough to flake it - The nickel should be dry not moist -

Now as to rolling — Benson tried some experiments of mixing fine ground nickel graphite & water, & pressing between the rolls with a spring behind them, it did very well — I think it will be a tedious job to hand roll the whole so a pair of thick rim pulleys got from the mine anywhere from 20 to 30 inch diameter & 6 to 12 inch face should be put together & one rolled having the bearings fixed & the other roller having springs pressing against the bearings to get the proper pressure on the material — Cal Fried can make this

Simpkins can lay it out of doors —
or perhaps the mixing can be done with
the same roll that crushes the nickel —
in any event be sure the nickel is ground very
fine & well moistened so that after the
final mixing it shows no nickel under the
microscope & also do not mix it in such
a way that the flakes of graphite are
all broken up into finer flakes —

After mixing the whole should be dried
to a point where it is just right for
briquetting — a test briquette should be
made to ascertain the proper point.
Then immediately put in closed bottles

so no further drying can take place then when you are ready to mould the big bricks you will have it in the right condition —

Have Benson make the Briquettes on the bricking machine & as fast as made put in closed boxes to prevent Evaporation & drying so when you start to press them in big grid they will have right moisture & not be too dry —

Freddy Ott to do all this in connection with Brown —

Rafn is to see that furnace in barn is all right — make a preliminary test with ~~[illegible]~~ a cylinder as full as it should be = He is also to get a better dish or way to ignite the Oxalate of iron so there is no scales from the pan going into the Oxide — possibly Mr Rogers can make him a bent up dish of sheet nickel to be placed on sand bath or in an iron pan of same shape also made by Rogers to fit the nickel pan

The Nickel dart scale, it can be thin.
The iron pan can be made of heavy iron
the nickel pan just fitting inside —
I think the pan might be round & just
set over the hole in the top of one
of the brick furnaces in front room or
perhaps put in the muffle — The
Oxalate being stirred well until
thoroughly oxidized —
Rufus can get Dalley to make any
platinum thermometer he wants —
Shall need about 30 pounds of
Fe_2O for the 20 cells ——
Shall need 55 pounds of Nickel Oxide
also about 30 pound graphite

Hard Rubber — sheet stock & supplies are to be ordered by Rogers to make the 20 Cells — or as many as he can get stock for —

Aylsworth to get out the nickel & Oxalate may have to get an Extra man to run nights,

Rafw may also need to get another man to run Iron furnace nights —

It is preferable to make a 15 plate Cell 10 of nickel & 5 of Iron

This evens up the amount Each iron plate has to do better than any other Combination

If it is found impossible to get the stack for 20 15 plate cells - then make as many as possible with the stack that can be got =

There may be some trouble in getting the nickel plating done if we say to Mr Gilmore that I would like to have the plating works run nights for us - we paying the nickel plater an extra bonus + also any extra man that may be required —

The pressing in at Silver Lake should be done as far as possible without interfering with Mfg there as they are behind ardens - possibly we could use presses Sunday all day.

they are working nights now & can ~~dig~~ hardly spare pickers for any length of time as I understand it.

The Solder used on the Cans shaved 6z Cadmium Solder same as that used on little round ~~test~~ Cans in middle room — Its formula is I think 75 Cadmium 25 tin — Freddy Ott knows — Dont use ordinary solder as the Potash dissolves it

---

The Crates for holding Cells are not to be made until I return —

Horten =

Go ahead and take charge of the ~~[illegible]~~ placing and arranging of the Silver Lake Chemical Co works = Because since ~~[illegible]~~ seen that the work is carried on contrary upon instructions Order what is necessary through Mr Walling to carry out the plan as agreed upon between Myself & Fraylowarth, & advance the work as fast as possible & get everything in position ——

Push the furnace in the Barn for Rogers as he must make a lot of wax for the 20 cells of battery Rogers is making & has not got much time to do it — any changes he wants make them quickly

E

Fred Otto -

Dont fail to make the Rocking arm for bouncing the cell while being tested - Keep this test up right along & keep account of the material falling out, = Be sure in all future test grids & in big lot for 20 cells that the stuff is ground fine & rolled so no nickel can be seen in micro - The Balls are the best to grind nickel fine -

Read over the general instructions in regard to the 20 cells & help out as much as you can - Especially Benson on grinding & also mixing the nickel - The same plan found good for nickel will probably answer for the iron

E

Unbound Notes and Drawings (1908)

This folder contains dated notes and drawings from 1908, as well as undated material possibly from the same year. Included are items by Edison, Ludwig F. Ott, George E. Small, and other employees pertaining to storage batteries, phonographs, and Edison's planned concrete house. The majority of the documents are Small's notes regarding measurements, patterns, and molds for the house.

Approximately 30 percent of the documents have been selected. A sample of the concrete house material has been selected, consisting primarily of items providing overall dimensions for the house and its foundation. The unselected documents include drawings and calculations by Small regarding individual molds for the house and several battery drawings by Ott.

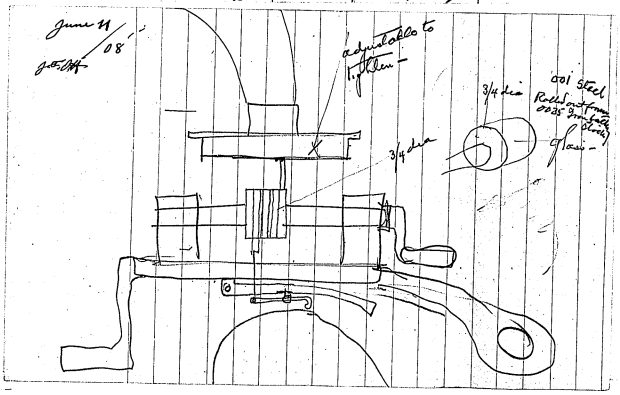
John —

To get around injunction of my Court we may have to cast cylinders solid & bore them out please

see if you can make a small bench machine automatic that will bore out Cold Solid Record in say 1 or 2 minutes =

The inside of those solid records is softer than the outside & can be made to bore out easily by a paraffine fluid or oil

June 11/08



Cub. contents of cellar.
As per drawing for first pouring
1st Figure walls up to ceiling. –

Back-porch.

2 × 5 × 6.3 × .83 =

11.17 × 6.3 × .83

21.17 × 6.3 × .83 = 111

Sidewalk stairs =

4.75 × 5 × .67 = 16

Stairs

6.13 × .67 × 4.5 = 169

Brickwall –

18 × 7 × 1 = 126

Sidewalk (Chimney left out) Bse

13.21

24.21

37.42 × 7 × 1 = 266

539

Sheet 1 539

Rt H sidewalk – staircase left out

15.33

3.75

19.08 × 7 × 1 = 133

Chimney –

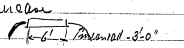
5.58 × 1.75 × 7 = 68

4 flues 8½" × 8½"

4 × .71 × .71 × 7 = 14

54 = 54

Staircase



Half circumf =

4.17 × 7 × 1 = 29.19

6 × 7 × 1 = 42

71 = 71

Rt H front – through front

5 × 7 × 1

7 × 7 × 1

12 × 7 × 1 = 84

891

Curved front - Mean rad 5'.6 — 12 — 881

1/ 154/360 x 17.28 =

7.38 x 1 x 7 = 52

Sides in front

1) .75 x 1.17 x 7 = 6

2) 2.83 x 1.17 x 7 = 23

3) 2.83 x 1.33 x 7 = 26

1.17 x .83 x 7 = 7

4) 2 x 1.33 x 7 = 19

1.17 x .83 x 7 = 7

5) 3 x 2 x 2 x 5.67 = 68

6) 2 x 1.17 x 7 = 16

172 — 172

7 .5 x 5.33

8.45
3.25
7.58
2.17
3.92

32.67 x .5 x 5.33 = 88

~~Hearth~~ 1/3

~~Chimney~~ 1/3

~~Stairs~~ -

1193

3 - 1193

Fences -

9 x 18 x .33 = 53.5

6 x 10 x .33 = 20 — 74

Piers - 7.58
8.75
7
23.33 x 2 x .25 = — 12
11.66

Fence piers + Mass

3 x 3 x 2 x 2 = 36

Floor -

18 x 50 x .33 = 300

Walls abv floor =

21.17 x 3 x .67 = 43

~~18 x 2 x .83~~

37.4
19.1
12
7.4

94 x 2 x .83 — 156

Hearth 1/3 - 25

Chimney 1/3 - 12

Stairs 36

1881

Partitions Cracks

2x5 = 10
2x6.6 = 13
23 x .33 x 4 = 30

3 x 9.75 = 29.25
6.75
8.75
57.75

58 x .33 x 9 172
33
9
2125

Columns
3 x 9 x 1 x 1.2
2 x 9 x .7 x .7
13

first pouring = 80 cu yds

Main foundation. July 15

Moulds weigh approx 265# each
" 4'-0" long weigh 65# for lineal ft

Height of building —

Basement to 1st floor	7'-4"
1st floor " 2nd "	10-0
2nd " " 3rd "	9-4
3rd " " roof	10-0
	36-8 say
	37'-0"

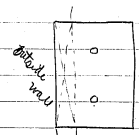
37'-0" x 65 = 2405
2 Moulds = 2
side walls 4810

Concrete 7'-4" x 1 x 1
side 10'-0" x .83 x 1
walls 9'-4" x .67 x 1
10'-0" x .5 x 1
x 150 = 4032

Floor moulds, etc
Floor slots and
Sleeves 240#
= continued

Live load is not included on floors but roof load of 50# per sqft is included.

Room 12'-6" x 14'-0"

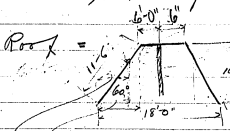


Moulds = 3.125 x 1 x 65# x 2 = 812.5

Concrete = 3.125 x 1 x 150# = 468.75

1st, 2nd & 3rd floors each = 968.75 × 3 = 2906.25

Roof =



Mould 9'-0" x 1 x 65# x 2 = 1170

Concrete 9'-0 x 1 x 75# = 675

Roof load 9 x 1 x 50# = 450

Ground total = 14043#

Continued

Foundation 4'-0" wide by 18" thick for one lineal foot requires the ground to support —

14045 / 3511 # per sqft

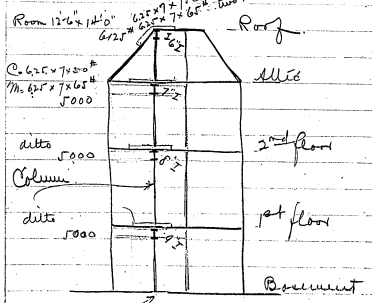
After moulds are removed the ground supports

Side wall concrete	4032
Floor loads 3 floors	750
Roof concrete	675
" load	450
	5907

say 6000# / 1500 # per sqft. which is very good.

Column loads. 7/16

Supporting floors + moulds.

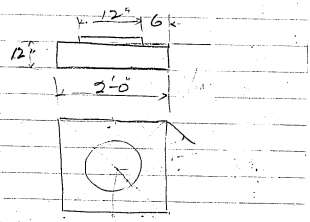


31000# for two columns.

$\frac{\cancel{\#}10500\#}{2625\#}$

Uniform load 7/16

$\frac{\cancel{\#}10500}{2625}$ # per sq ft.



Cantilever 16"

Uniform on beam = 5250#

$\frac{5250 \times 26.3}{8} = 15750$ "#

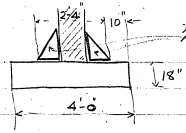
40) 15750

$\frac{393.75}{} = \frac{bd^2}{6}$

$d^2 = \frac{393.75 \times 6}{40} = 98.4375$

d = say 10" make it 12" thick

Main Foundation 7/16



Uniform load 3500# per sq ft to be supported by ground.

$$B.M = \frac{3500 \times 10''}{2} = 17500''\#$$

Concrete in shear 40#

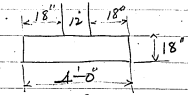
$$\frac{17500}{40} = 437.5$$

$$437.5 = \frac{bd^2}{6}$$

$$d^2 = \frac{437.5 \times 6}{12} = 21.9$$

d = 15 say 18" thick

Thickness req'd for wall alone say 6000# to be carried on fdn per lineal foot.



1500# uniform load.

$$\frac{1500 \times \cancel{18}^{9}}{\cancel{2}} = 13500$$

$$40 \overline{)13500} \quad 337.5 = \frac{bd^2}{6}$$

$$d^2 = \frac{337.5 \times \cancel{6}}{\cancel{12}_{2}} = 168.75$$

d = 13" so 18" is ample

Piers for carrying division walls

Partition moulds $7.5' \times 37' \times 65^{\#} \times 2 = 36075^{\#}$
" Concrete $7.5' \times 37' \times 50^{\#} = 13875$
Floor moulds $7.5' \times 46' \times 65^{\#}$ 2245
3 " Concrete $7.5' \times 46' \times 50^{\#} \times 3$ 5175
Roof moulds $7.5' \times 9' \times 65^{\#} = 4390$
" Concrete $7.5' \times 46' \times 75^{\#} = 2590$
" load $7.5' \times 9' \times 50^{\#} = 3375$

67725

Foundation 4'-0" square
Pier 16 sq ft of support

$16 \overline{)67725}$
4233# per sq ft

Load on C
Basement concrete column

Concrete partition = 13875
3 " floors $7.5' \times 9' \times 50^{\#} \times 3 = 10125$
" roof $7.5' \times 12' \times 75^{\#} = 6750$
Live load floors $7.5' \times 9' \times 40^{\#} \times 3 = 8100$
" " roof $7.5' \times 12' \times 50^{\#} = 4500$

43350

Concrete good for 350# in compression

$350 \overline{)43350}$
124 sq ins.

Column 12"x12" x 7'-0" high

$$P = \frac{a_1 - a}{a(r-1)}$$

$\frac{E_s}{E_c} = 15$

$$\frac{350 - 300}{300(15-1)} = .017 \text{ yield}$$

4 - 7/8" rods

weight per cub. foot sq. 130 lbs - per cub. inch .075

strip 1 foot wide - sq 10 feet span

$10 \times 13 \times \frac{1}{3} = 3.33$ cub. feet = sq 430 lbs.

floor 4" - 3" effective

$40 \times 4 = 160$ lbs per sq. foot 1600 lbs live load 1600

340 × 2 680

2280

sq 2300 lbs.

$M_o = \frac{M_o l}{8} = \frac{2300 \times 120}{8} = 34500$

$34500 = 397\ bd^2$

$d^2 = \frac{34500}{397 \times 12} = 7.25$ $d = 2.69$

1.6 mm

Shear $= .0084 \times 2.69 = .0226$

½" sq. bar - .25 $\frac{.25}{.0226} = 11"$ apart

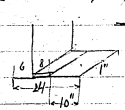
3/8 - .14 $\frac{.14}{.0226} = 6\frac{1}{4}"$ apart.

flooring

$120 \times 12 \times \frac{3}{2.6} \times .075 =$

wall - figure 10 feet to foundation -
when all 2' footing - and the plates
or 5000 lb -
figure 10000 lbs per 4 feet of ~~length~~ wings
or 2500 lbs per foot of walls of ma
~~when foot~~ figure 1/2 width of footing - or 2'-wide
press per sq. foot $\frac{2500}{1 \times 2} = \underline{\underline{1250}}$ lbs. -
footing of 4'-0" wide is O.K.
press per sq. inch $\frac{1250}{144} = \underline{\underline{8.7 \text{ lbs}}}$

with 8" flanges for base - plates.
$\frac{2500}{12}$ per foot of width $= \frac{2500}{12} = 208$ per inch
press. on corner per sq. inch $\frac{208}{1 \times 8} = \underline{\underline{26}}$ lbs -



press. $10 \times 9 = 90$ lb. -
$m = .5 \times 90 = 45$
1200 inches

$1800 = 397\ bd^2$
$d^2 = \frac{1800}{397} = 4.56$ - 8" sample
$.0084 \times 4.56 = .0383$ sq. inch steel per inch
$\frac{.25}{.0383} = 6.5$" apart

Cu. yards of lime for drawing —

Back porch —

4.3 ×
4.5
9 5
18.1 × 2.5 × 1 = 45.3

4.3 × .75 × 2.3 = 7.4

L. H. line main

46.5 × 4 × 1.5 = 279

1 × 3 × 1.5 = 4.5

R. H. side

17.58 × 4 × 1.5 = 105

13.5 × 3.5 × 1.5 = 71

5.7 × 2.5 × 1.5 = 21.4

7.8 × 2.5 × 1 = 19.5

5 × 4 × 1.5 = 30

10.4 × 3.5 × 1.5 = 54.6

Back

10 × 4 × 1.5 = 60

Front

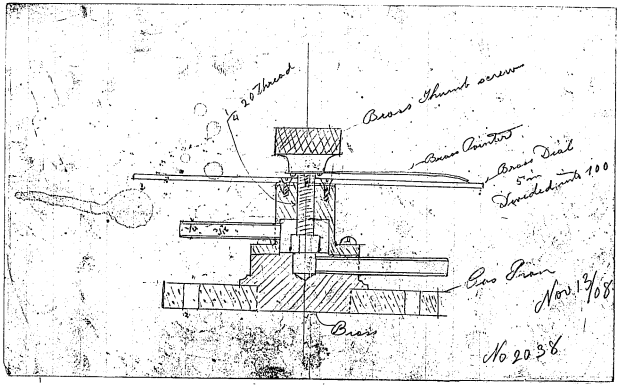
6 × 14.4 × 1.5 = 129.5

1 × 7.5 × 1.5 = 13.1

7 × 5.1 × 1.5 = 53.5

893.8

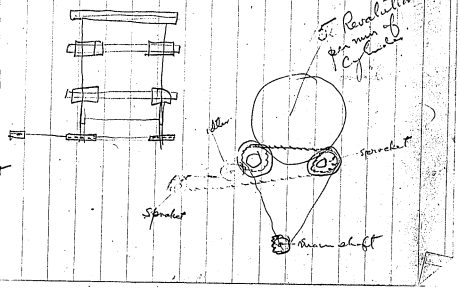
say 894


1/4 20 Thread
Brass Thumb screw
Brass Pointer
Brass Dial
5 in
Graduations 100
Geo Green
Nov. 13/08
Brass
No 2038

Nov 30/08
J F O'H

All joints & Rivets
Darkened with
Spirit and Sulphur
Outside —

Cylinder & Everything
Exposed to Liquid
Monell metal
Except Rivets they
Can be pure
Nickel = we have
some malleable cast
Nickel —



Weber

Have you a 5 HP

Motor to Spare

Edna

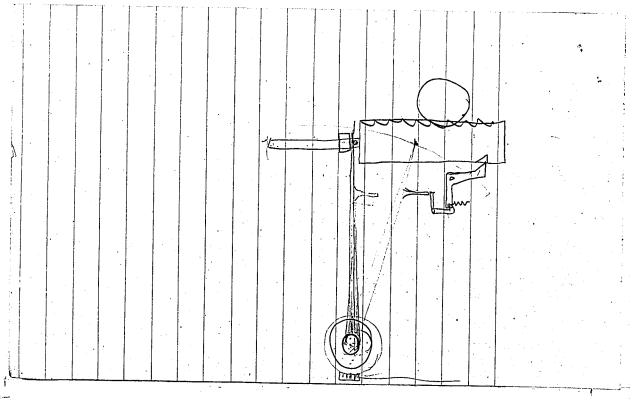
Yes

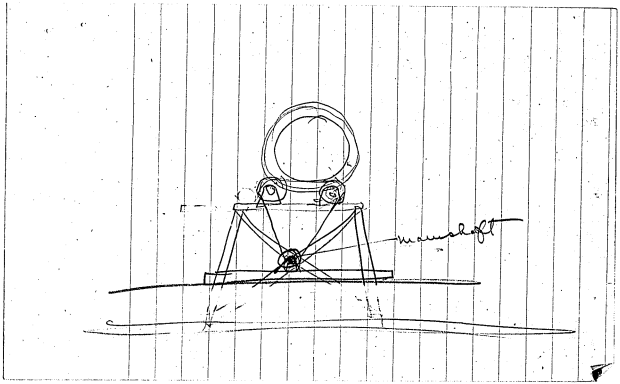
We have a 10 HP Motor
220 Volts. that we can spare

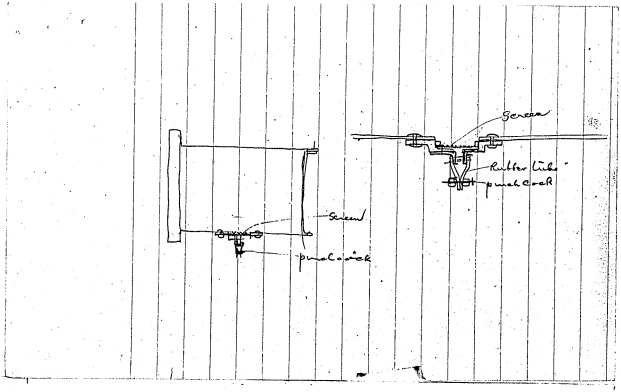
or we can loan you
temporarily a 4 HP 220 Volts
which is intended to drive
one of the spinning round
machine

P. Fisher

[ON BACK OF PRECEDING PAGE]




main shaft


Screw
pin & crick
Screw
Rubber tube
pin & crick

Solenoid outside
Shaft Bearings
4"
36"
24"
Piston
Supporting bearings
Jackscrew
4"
Plan of Carriage

[ON BACK OF PRECEDING PAGE]

No 10 B8

✓ One Sheet of Steel 8 mm about $\frac{191}{1000}$ thick

✓ 3 feet nickle 7 feet long

2 shafts 1 in 3 feet 8 in

1 " 1 in 3 feet 11 in

✓ 2 Sprockets S.T. 1 in Pitch $\frac{3}{16}$ hole $1\frac{1}{4}$

✓ 2 " 2 4.T. 1 in " $\frac{3}{16}$ "

✓ 1 Boiler Plate 3/8 thick 26 $\frac{1}{2}$ in round

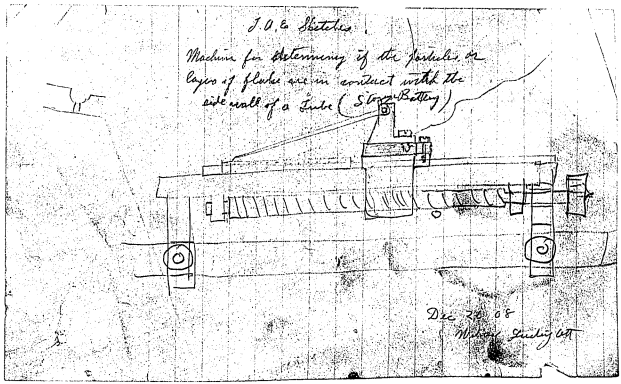
2 Machine Steel Rings Outside diam 27

1 inch nickle Inside diam 24,581

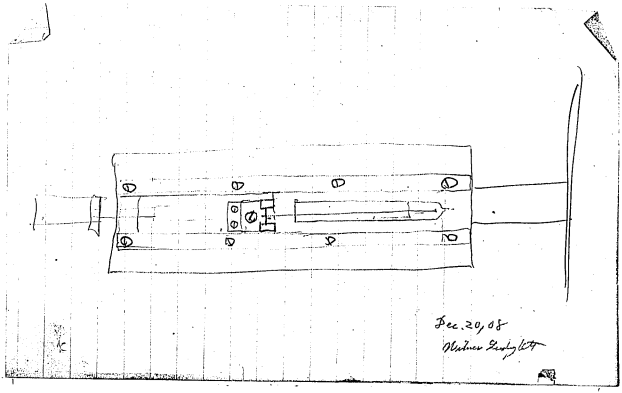
One pulley 8 in by 2 1 bore

J.O.E. Sketches.

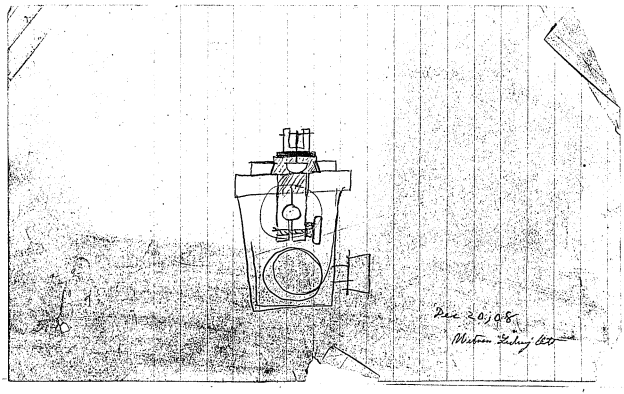
Machine for determining if the particles or layers of flakes are in contact with the side wall of a tube (Stone Battery)



Dec 20 08
Nelson Lindsley Jr



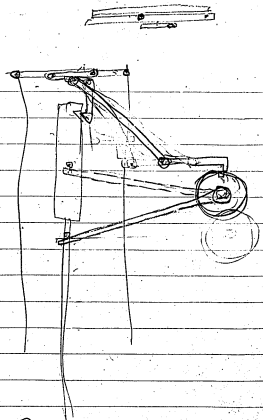
Dec. 20, 08
Nelson Lindsley Jr


Dec 20, 08.
Western Gelang Ltd

Unbound Notes and Drawings (1909)

This folder contains dated notes and drawings from 1909, as well as undated material possibly from the same year. Included are items by Edison, John F. Ott, and other employees pertaining to molded phonograph records and the possible use of storage batteries by local railroads.

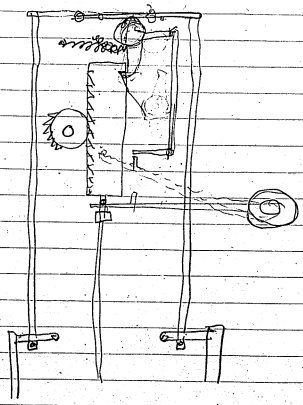
All of the documents have been selected except an oversize map of Erie Railroad routes around Orange, New Jersey.



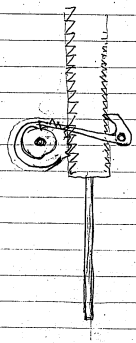
Round Bucket Loading Machine

Jan 13/09

J F Ott



Jan /09



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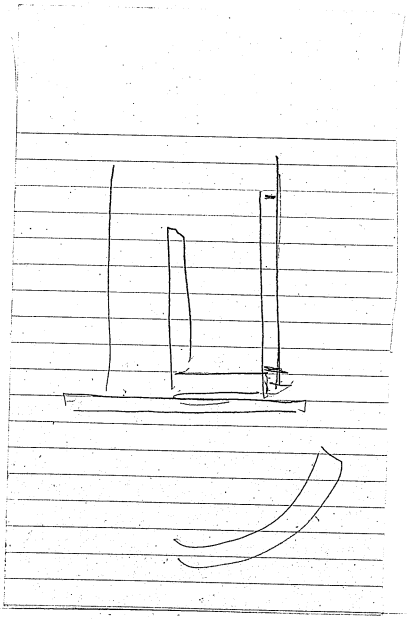
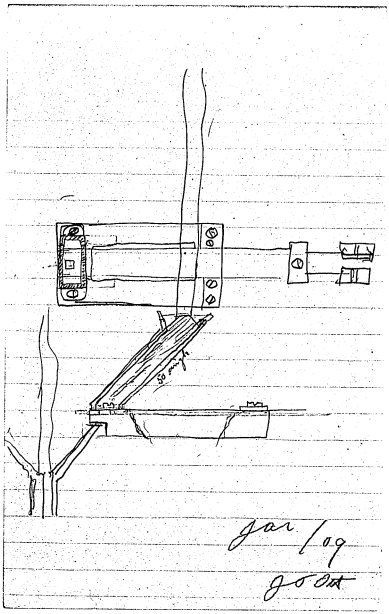
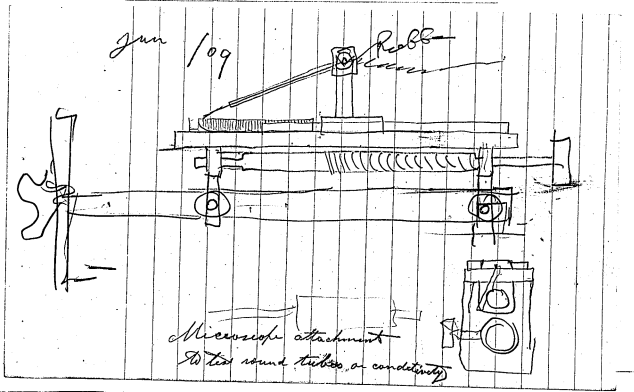
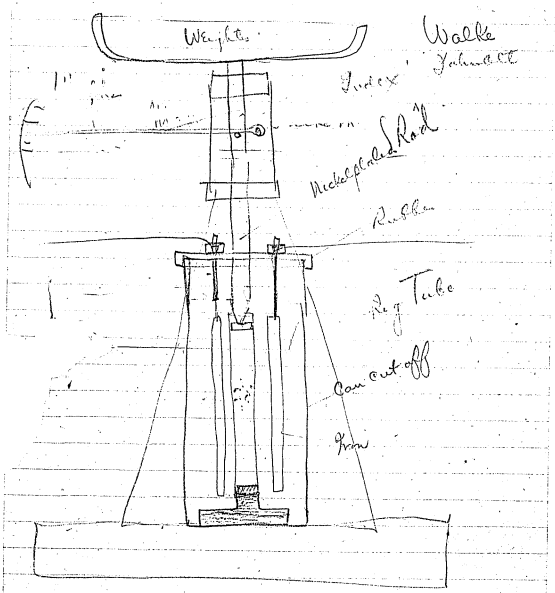
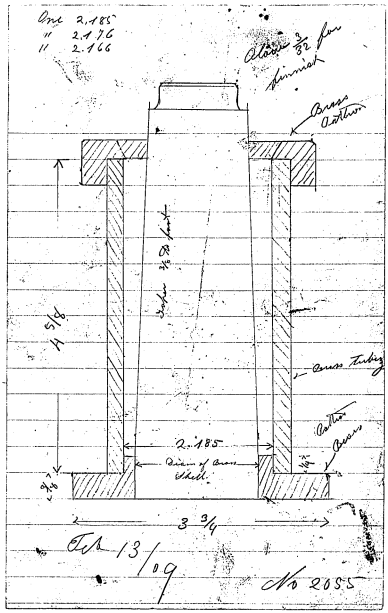


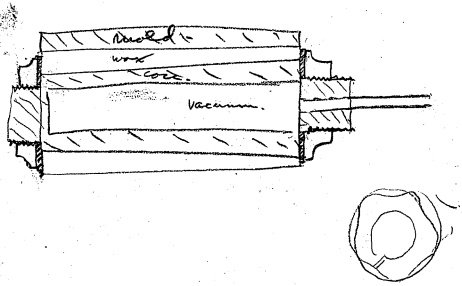

Jan 1/09
Jan 1/09


Jun 1/09
Rubber
Microscope attachment
to test round tubes, or conductivity



Bell to test expansion of Gun
Tested by charging Jan 1/09





The aluminum Cylinder 2 1/32 diam 6 in long

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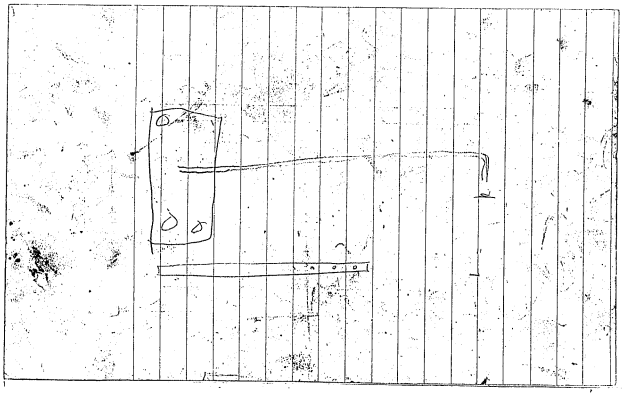
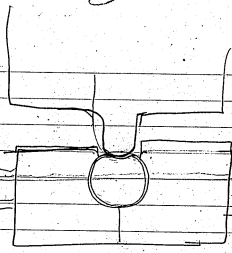


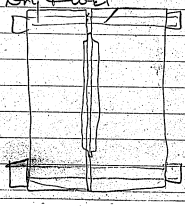
Mean 2.256.
2.237
2.223
.14
Mean 2.185
" 2.186
" 2.186
This shell is thicker 14 in 4 1/4 in
2.162
2.176
Wed 8 Oct 1890
14.5/8

John Ott - Fred Ott



Fred Ott would make the to Corrugate tubes —

Try Dry & wet



Erie

Orange Branch

10 Trains 10 stops Galway

Terminals — average time stops

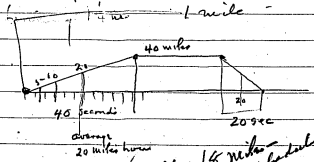
30 seconds of acceleration is 1 mile

per hour per second and 40 miles

hour maximum —

10 stops in 6 miles 30 sec still

1 mile —



braking speed only 18 miles

Time calculated

$\frac{52400}{3930}$

$\frac{13}{}$

average speed 20 miles

which compares with

1 Hour 120 miles $\frac{52400}{1048}$ $\frac{80}{2400}$ / 2620

$\frac{2620 \text{ ft.}}{1310}$

3930 ft 1 min

140
33

2

110 Tons full train 4 Cars + SBC Car —
40 with tow mile — Trip NY + back to Maplewood 32 miles
140 KWH, taken out Battery. 450 KWH in —
goes on charge with ~~so~~ 310 KWH in —
1 Hour to put on 140 KWH — Charge rate
for A8 80 amp — 60 being Normal —
240 KWH actual Taken to get the 140
Hence round trip requires 240 KWH — at bus bar
or 7.5 KWH per train mile — or 1.875 KWH
per passenger car mile — including SBC at bus —
1c KWH gives costs for trip train mile + car mile —

3

	Leave Map	arr NY	Leave NY	arrive Map
No 1	6 am	640	7	740
	620	7	720	800
	640	720	740	820
	700	740	800	840
	720	800	820	900
	740	820	840	920
	800	840	900	940
	820	900	920	10.00
	840	920	940	1020
	900			

5 trains — } of SBC
3 changing

20 minutes apart both ways —

6 am till 8 pm = 14 hours - 44 trains each way —

probably 8 trains be best for Rush —
8 Cars each 4 of which passenger —
40 Cars 80 motors —

140 / 35 | 3000 (857
2800
200
175
25

225
70
155

450
315
135

(4)

140 KWH round trip 450 in —
9 — 310 left in —

If — 225 KWH, 30 min each end
70 in —
155

Discharge rate too high —
to do this double discharge rate must be
attained, If Cored 1/2 wt battery
or double discharge rate cored save
1/2 battery weight or diminish
24 cost 246 for each trip MY to Maplewood
— up —

Commutation 1.12 mile —

27456 — 50 — 6 yrs —
164736 | 3164716 / 329472 / 240
7031289

94458 | 64800 (1.12
7
91440
44
16

20

12 — 88 — 246 — 1040 — 15 — 246 (16
2 — 2 — 84 — 312 — 900 — 2 — 600 — 2 — 1100 — 9
1 — 312 — 624 — 3744 — 7488 — 96 — 94 — 1944 — 1944 — 11 — 61 — 3 — 8 yrs.

(5)

1.12 mile — 22 miles average 24.64 Cents per passenger

11
112
1232

If average 30 to car - 4 Cars, 120 to train

at 12.32 Cents Each $14.78 — Each trip one way

120
2464
1232
14.784

88 single trips 1478

88
1824
1824
1300.64

$1300. in receipts of all

Commutators —

$1300. receipts daily —

say 6 - Trains — 10 hours work day (6)

1 Motor Man 2.75

1 Conductor — 2.75

1 Brakeman — 2.25

120 KWH Each Single Trip 1¢ KWH. 1.20 -

Oil waste - 0.50

Brakeshoes 10

8.35

10 Single Trips — Current 12.00 —

Wages & supplies — 8.35

Bailey Depr. 6 yrs — 25.60

$45.95

4.59 - per single Trip

Rept. $14.98 = per trip Train average 1/2 full

all at Commuters rate 1.12 ¢ mile

1478

459

$1019 = out of this Comes all car repairs

track repairs, Station Expenses

& General Expenses — Motor repairs

+ every other old thing

7

1500
7500

Loco Coal 17.00 =
10 Men Engr 6.00 -
" Fir 3.00 -
" Fillm. 1.00 -
Loco Repairs 5.00
27.00 =

$500. depr. each year
1000. Repairs "

20) 10000 (5

Say 27 per day — for Loco — 150 miles run

Conds. 2.75
Brakes 2.25
Yd Engine 60
5.60
27.00

10 Single trips

Oil lands } 60
Brakes Stoom }
33.20 —

Steam 33.20
Electric 45.95
23.40
22.55 possible

If Spal Gallery needs to double
decay & chg rate —
it would reduce Electric 12.50 daily
If make own Current, 500 — "
or If Gallery lasted 8 yrs — Reduce 560
23.40

possible

10.60 is easy & probable —

45.95
1060
35.35 — Electric

8

D ~~[illegible]~~ Track Trolley 11000 mile
Maplewood 16
11000
16
17600 investment.
Starting Very bad –

Erie 124 trains all roads, going to NY in 24 hours

Electric Investment over 100000 trolley

87000 Cars – 296 000 for Trolley Cars –
296000 176 000 " Trolleys, on line
but considerably more in yards – probably
Trolley on NY to Wapping Cost double
that, if it bundled things would be
paralyzed – Trolley Car system reliable –

If Battery Car Cone away with &
battery put in 4 Cars 9000 lbs Each Car
this would reduce weight of train, probably
20 tons + would some investment in battery
but if Cars would have to be out of use
when chg. — Trip to Mf 1 hour back to Maplewood
1 hour — on chg 1 hour. as cars are not
very costly probably increased investment
would not be over - 35000, as Cars would
not be used when chg'd there would
be no depew hence depew would only be
2/3 of what it would be if running
all the time — passengers would be
in train ~~time~~ train could start on sharp
time, Battery Cars not require same
Care as if on a Car by itself - but
train of 6 to 10 Cars or more could
be worked, if grades are low —
1/2 motor & half Reg Cars could be
used, & this in summer would be
OK on any Train — Certain Cars
Could be shunted off on an Emc trolly siding
to get new bat without the trolley —

/

Low Grade Line –

Cost. Power station 75000 HP Capacity	3.054 500
Transmission line, including towers, Copper + additional right of way 140 miles	989 725 –
14 Sub Stations	1 410 000
Third road construction + Trackbonding. 425 miles –	3 400 000
Engineering, Inspection, supervision	125 000
Contingent – 10%	897 923
Total.	9 877 148.
	3 [illegible]
	7 [illegible] 148

72% of bus bar power is delivered to locos. to drawbars.

260 588 000 HP Hours per year are required –

Line 132 miles Enola + W Morrisville –

Daily East bound cars av 2892 max 4338
" West " Amp 2285 max 3427

180 electric locos needed 10% of which in shop –

Thinks Elec should draw 70 East + 90 West
go over hill 5½ hours. May no trains to
be handled in one direction 62 – ~~7~~
attend loop 30 min inspection + goes back +
go on 2 hours & make trips day 24 hours.

41 Elec. Locs wanted
add 9 extra for repairs etc —

Estimated Elec Locs Cost $70 000. Each
Total Cost of Locos for repairs $3 520 000

Expect on Steam Locs 5% — at least scrap value of
20% of its Cost, to wit $18800 1st cost.

8 lbs Coal for Steam Locs HP drawbar

Trains in lbs per ton 4.2 lbs —

Total Cost fuel Steam Locos $1 374 330 Yr

1.79 mills per Elec HP in suppressed calculation

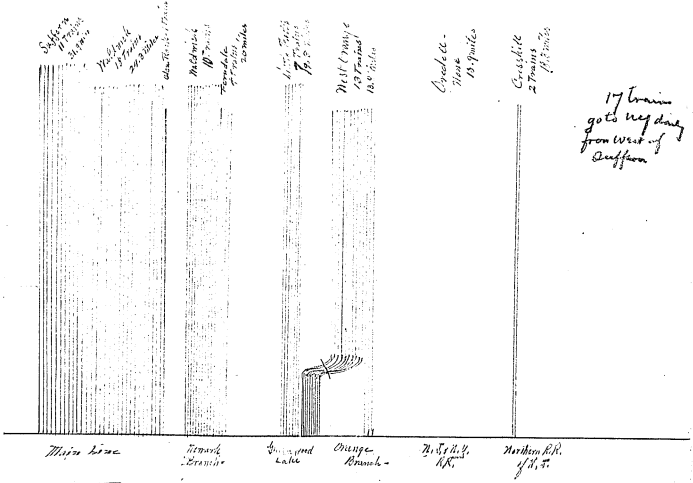
average out Cars East bound 55 tons
" " " West bound 20

Average net trains flat tons Steam Eastbound 2750 Elec 3850
" " " " Steam Westbound 1300 " 1800

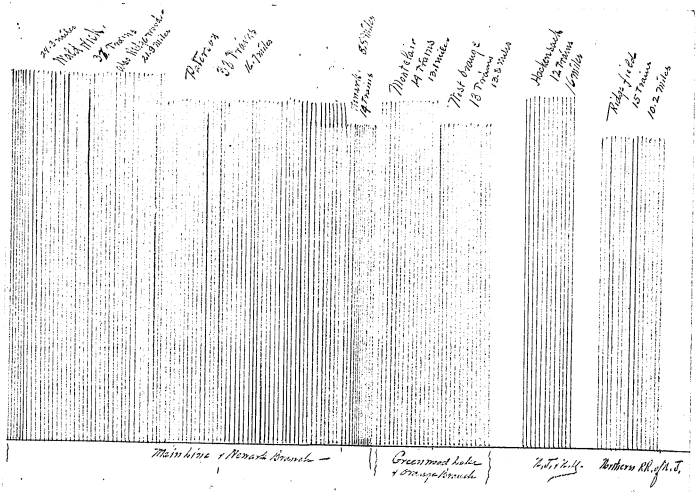
Steam drawbar pull 10400 Elec 14400

Train be operated like Suburban
Railway so same rates of wages
attained —

High discharge costs
Can be sold for 1/6. more
per cell but 1/2 the cells
required —



Trains originating at above Stations.

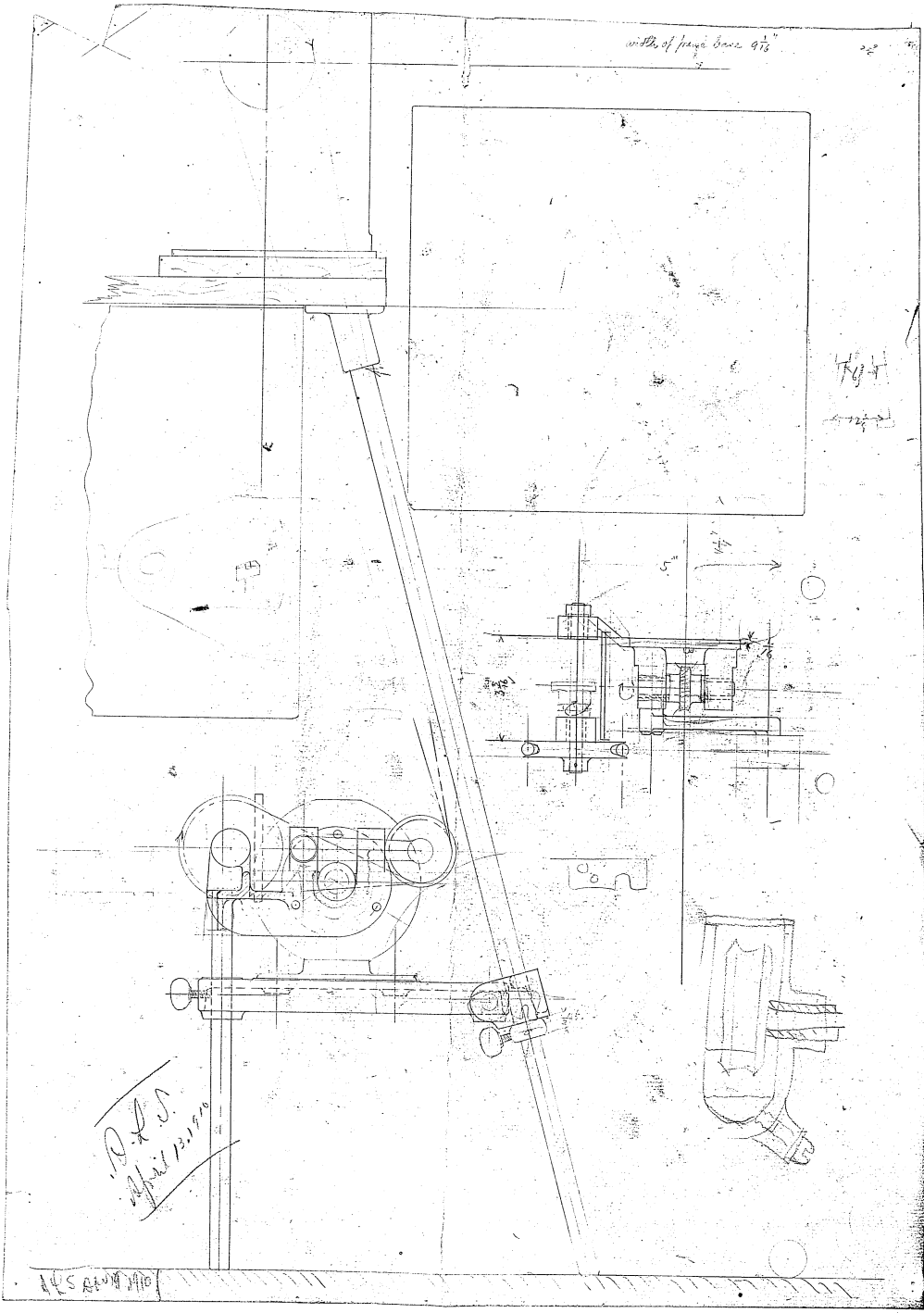


All Trains Stopping at above Stations.

Unbound Notes and Drawings (1910)

This folder contains dated notes and drawings from 1910, as well as undated material possibly from the same year. Included are notes and calculations by Edison regarding the use of storage batteries by railroads, along with items pertaining to phonographs and motion pictures.

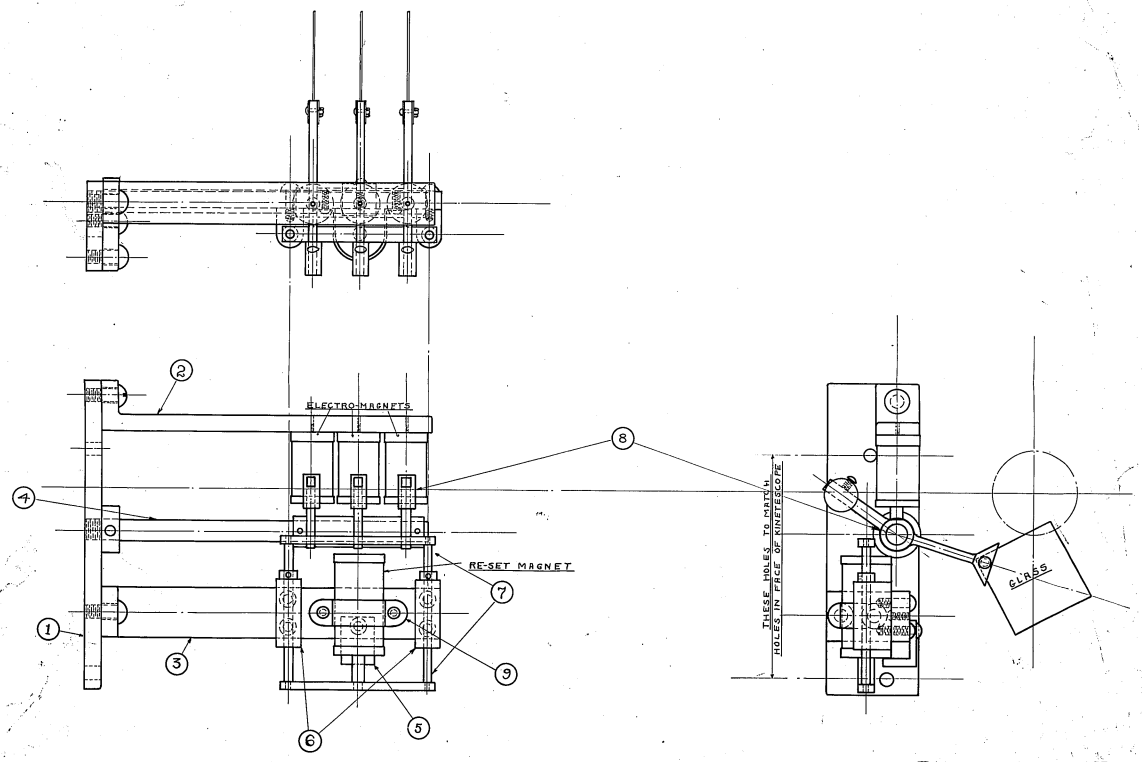
Approximately 50 percent of the documents have been selected. The unselected items consist primarily of Engineering Department notices from the Edison Phonograph Works involving parts for a disc phonograph.


width of forge bars 9 1/16"
R.A.S.
April 13, 1910
U.S. Patent Office

P. K. Mach

Not true

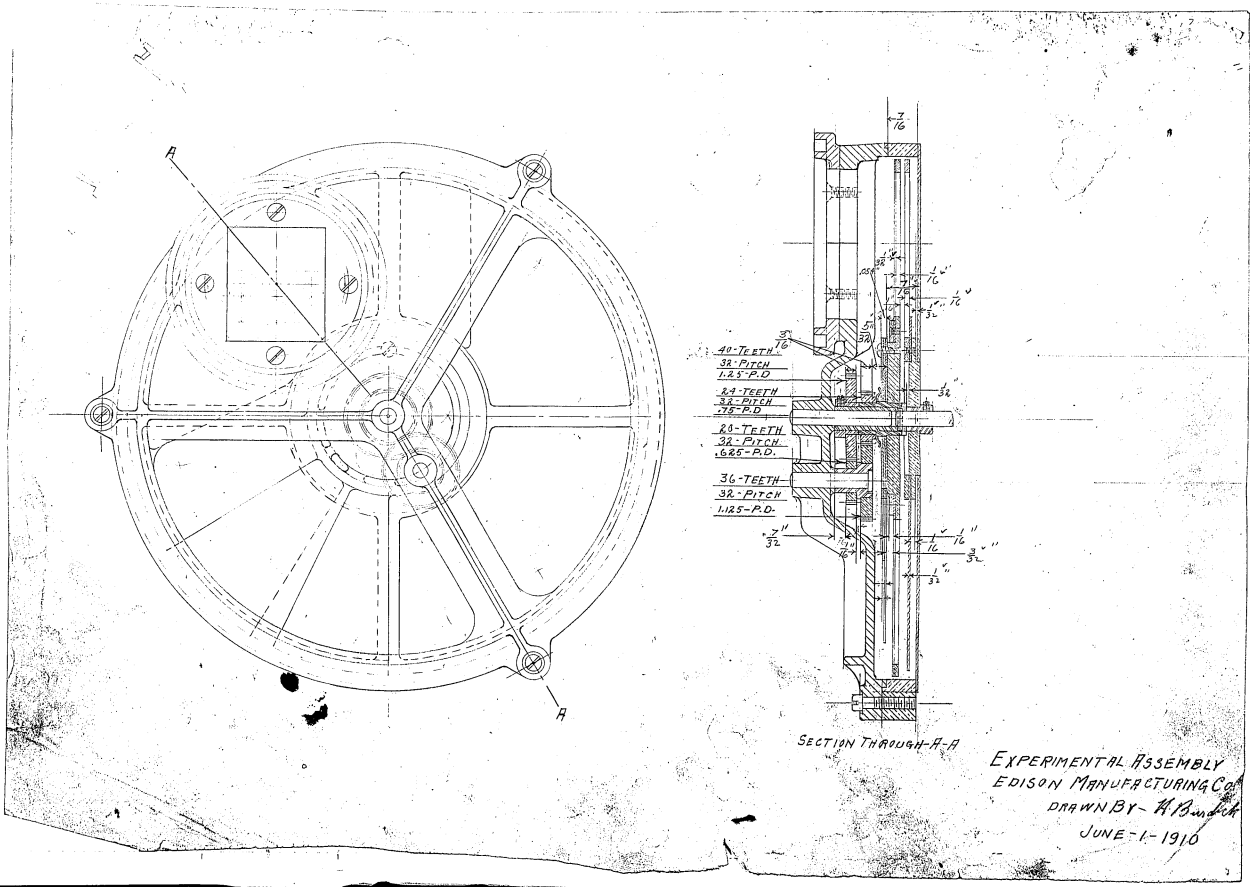
[ON BACK OF PRECEDING PAGE]

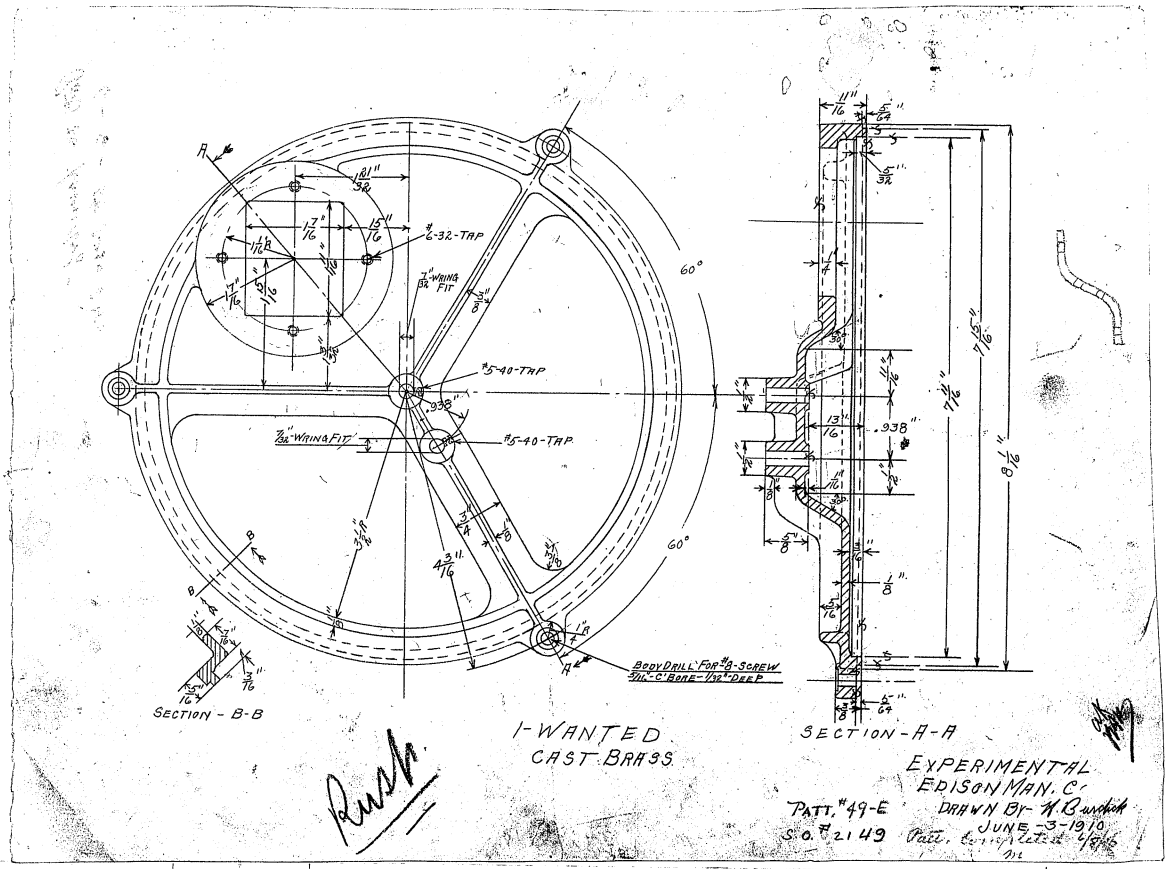


P.K. EXPERIMENT
FOR
MR. EDISON.

SCALE - FULL SIZE

MAY 28, 1910
#2161.


A
A
40-TEETH
32-PITCH
1.25-P.D
24-TEETH
32-PITCH
.75-P.D
28-TEETH
32-PITCH
.625-P.D.
36-TEETH
32-PITCH
1.125-P.D.
SECTION THROUGH-A-A
EXPERIMENTAL ASSEMBLY
EDISON MANUFACTURING Co
DRAWN BY- H. Bunch
JUNE-1-1910


#6-32-TAP
7/64" WRING FIT
#5-40-TAP
.938"
7/64" WRING FIT
#5-40-TAP
60°
60°
BODY DRILL FOR #8-SCREW
5/16" C'BORE-1/32" DEEP
SECTION - B-B
SECTION - A-A
.938"
1-WANTED
CAST BRASS
Rush
EXPERIMENTAL
EDISON MAN. Co.
PATT. #49-E
S.O. #2149
DRAWN BY
JUNE 3-1910
Patt. completed 6/8/10

Path to boundary —
6 – 8 – at base 8 ft

[ON BACK OF PRECEDING PAGE]

20 Car Train 75 Tons each

First grade 1½ miles 135 ft mile –
Must push 1050 Tons + 20 cs –
6¼ miles of road

2nd Grade 2 miles 106 ft mile
must push 1050 Tons + 20 cs
17 miles –

3rd Grade Sylvanville ½ mile 71 ft
must push 600 Tons + 20 cs
110 miles –

4th grade, Wharton 10 miles 50 ft
Must pull 750 Tons + 20 cs
(1 Run) same grade 16 miles 132 ft mile must pull 1125 Tons + 20 cs
" 4 miles – low 1 mile 53. 450 Tons + 20 cs
144 miles

Think 6 miles push on 4th ok

5th + Last grade Cutter

7 miles 50 ft. pull 450 Tons + 20 cs
3 miles 57 " 450 Tons + 20 cs.
1 mile of 105 ft must push 1000 Tons
1 mile of 148 ft. " 1275 Tons
1 mile of 137 ft 1200 Tons
3 miles of 148 ft 1275 Tons
158 miles
from Sagmore,

Think 6 miles push here ok –

20 lbs pull for each ton 1% grade 52.8 ft – 2.55% grade equals 135 ft to mile on 1st grade, then at 20 lbs per ton

1050
250 loco
1300
52
1300
1000
63
63

66300 lbs draw bar pull – add 10 lbs per ton for bearing friction increases it 13000 lbs total 79300 lbs draw bar pull, say 80000 lbs,

If done at rate of 5 miles per hour requires 18 minutes pulling –

Total power expended 320 HP in 18 min –

2nd grade probably abt same Total HP –

3rd grade

4th grade 10 miles Draw bar pull 24000 lbs 640 HP
6 miles 84000 draw bar, 1331 HP
4 miles – 700 tons including Loco
This grade 1650 KWH,

10 miles 15 miles hour
6 " 5 miles hour
4 " 10 miles hour
} 136 minutes 2 h 16 minutes

35 | 1680000
35 600

16 miles 5 loco –

80000 lbs draw bar pull –

3379 HP 2530 KWH. Each train, 5 miles hour

3 Hours steady rate 1127 HP per hour

2 hour trip change 2 hours –

6 Trains daily – 120 Cars –

6000 Tons daily –

120
50
6000

1200

3 | 3379
1126 3 –

5280
16
31680
52800
844800
6 | 5280000
6 | 5280000
1584000
1584000
1584000
1584000
1584000

3379

Total KWH daily
15180 - at 40% Eff - 36000 KWH,
12 hours charging
Requires 3000 KW Capacity
in the 5 Stations — say 4 Stations
750 KW generator Each station
~~12 36000 3000~~
~~36 3000~~
~~48~~
5 3 Car Locos —
100 000 lbs Total Torque for 3 Cars
250 Tons wt for the 3 Cars —
~~Allowed~~

@ 55 000 Each Car @ 165 000 Each
165 000
3 Car Locos @ 825 000 — for Locos
3000 KW - at @ 100 equal 300 000
Total 1125 000 —
Overall 1.290 000 -

20 Car Train —

First grade 1½ miles 135 ft mile must pull 14 Cars
Loco pulls 6 — 1050 Tons + Loco
6¼ miles

2nd Covode grade 2 miles 106 ft mile must pull 14 Cars
Loco 6 — 1050 Tons + Loco
17 miles

3rd grade ~~Sykesville~~ Sykesville ½ miles 70 ft mile must pull 8 Cars
Loco 12 — 600 Tons + Loco
110 miles to

4th Grade Wheatlon 10 mile 50 ft must pull 10
then 16 miles 132 ft mile must pull 15 Cars —
then 4 miles down 6 and 1 mile grade 53 ft — must pull
10 Cars — 1225 Tons + Loco
144 to

5th Grade Cutler — 7 miles 50 ft must pull 10
then 3 miles 57 ft 1 mile 105 ft 1 mile
148 ft 1 mile 137 ft 3 miles 148 ft —
must pull — 17 Cars —
158 miles End

18 Car Train loads on sharply 1½ miles 135 ft mile.
Covode 1½ miles 136 ft mile
Sabula 2 miles 50 ft
Wheatland 10 miles alt 50 ft
Ilion 6 miles 132 ft
4 miles lowest 1 mile 53 ft

Cutler 7 miles 50
3 of 105
1 148
1 137
3 148

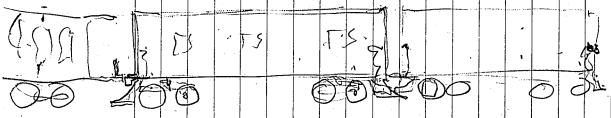
It looks as if the Great plan was to construct 18 Car Train 12 axles, 200 HP on each axle – 2 1000 HP Eng working Dynamos – + 100000 lbs adhesion + 80000 draw-bar pull or even 300 Ton – 3 Car loads –

Engines high speed worked unscrewmically – Engines Exhaust in stack or forced draft –

1 Engineer, 2 firemen –
2 Cars with boilers 1 with Engine –
all not on drivers –
only used of grade section geared for about 5 miles hour over the few miles of high grade + 15 miles on bad grade

[JULY 20, 1910]

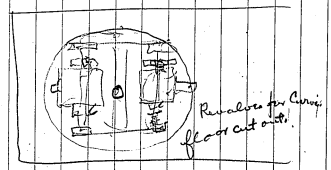
No 1

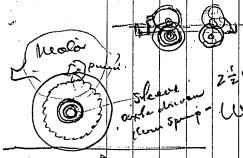


Each unit complete,

6

No 2

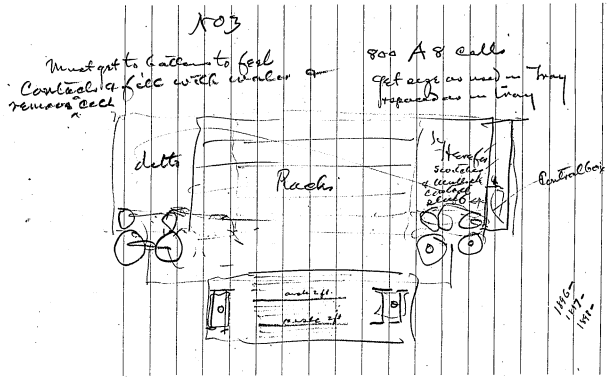




2½ clearance between axle & sleeve -

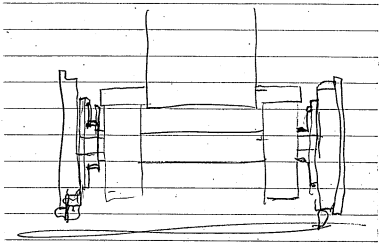
Want to get motor in Car

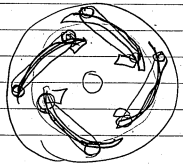
Rear

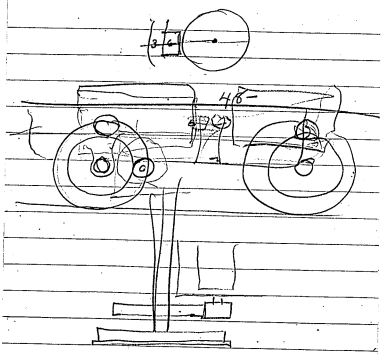

103
Must put to Gatten to feed
Control & feed switch under
remove deck
80p A 8 calls
get axe as need in tray
prepared in tray
delta
Racks
Hatchet
Scissors
Knife
Control Box
1916
1917
1918

104—

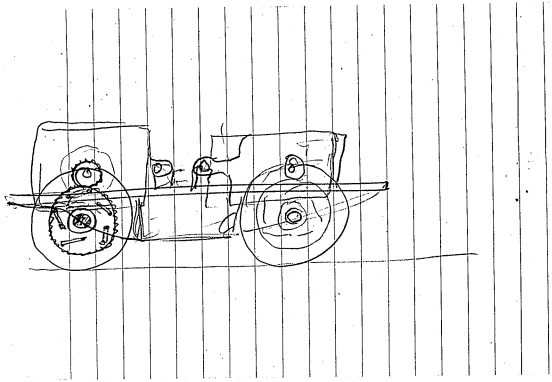
[JULY 20, 1910]

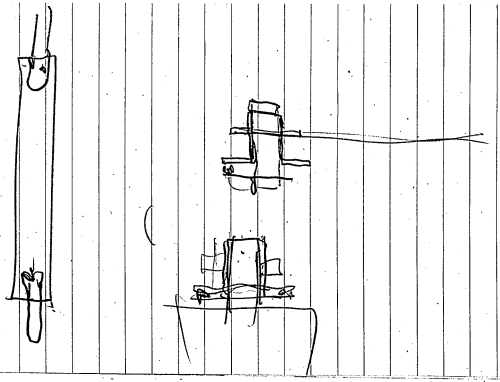






[JULY 20, 1910]





1½ pitch —

1½ dollars foot, inch width —

20" chain #30 foot

3

12
30
36
4
0
144

1/2 of chain

10" wide #720 foot

Chain on Car —

9 = 130 lbs per "

1½ = 270

I = 730

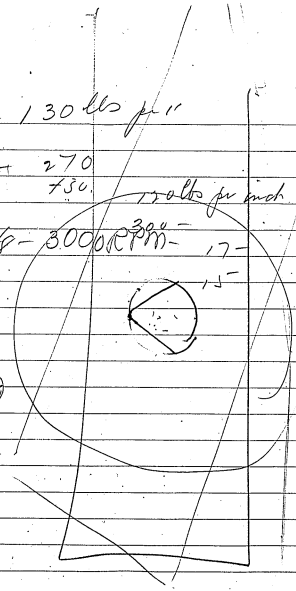
15 lbs per inch

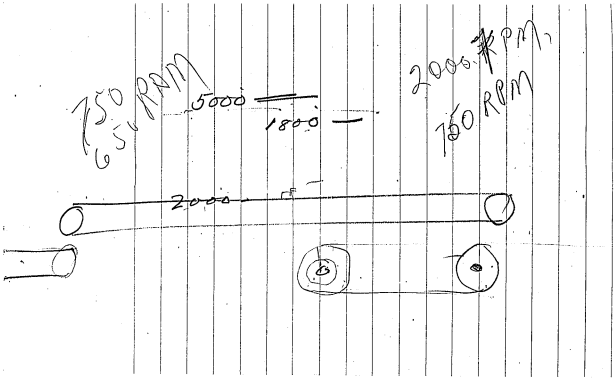
J8 - 3000 RPM -

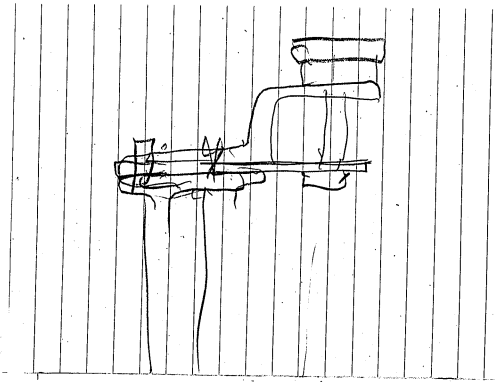
30" -

17 -

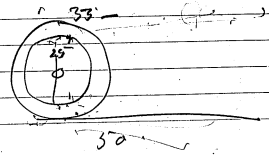
15 -







7-2010



350'

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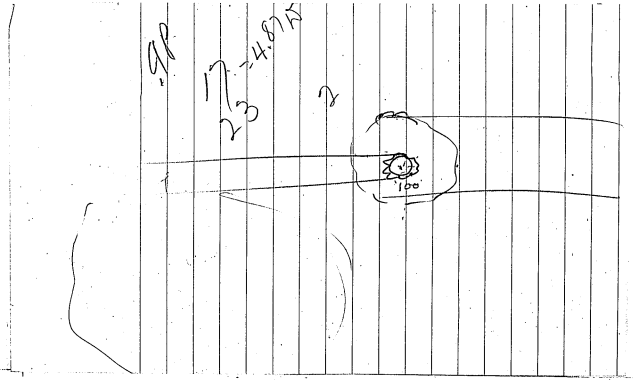
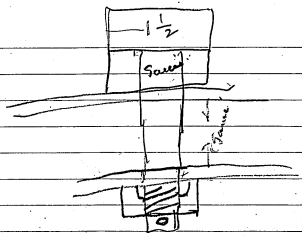
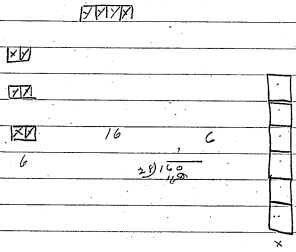
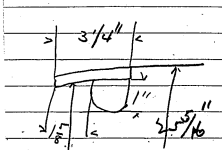


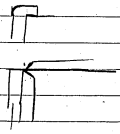
7-20-10

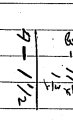

1 1/2
Sawn
Square

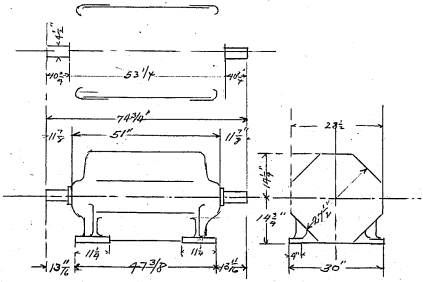

16
C
6
39/16
x


3 1/4"
1"
1/8"
2 5/16"
2 3/8"
1L

D
1/16 Thick.
20




B
1 1/2
1 1/4
1 1/2
D


4½"
10½"
53¼"
10½"
74¾"
11½"
51"
11½"
27½"
11½"
19½"
21½"
11¼
11¼
13/16"
47⅜"
13/16"
4¼
30"

G.W.
MOTOR.

11"
5 5/8"
11"
5 5/8"
5 7/16"
5 7/16"
8 1/4"

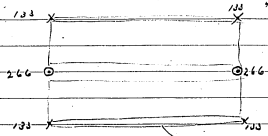
[ON BACK OF PRECEDING PAGE]

26- 10 1/2
26- 6"
10. 4 1/2

5- 2 1/4
2- 8
2- 6 1/4

2- 0 1/2
2- 6 1/4

133
8
1064
+532 -
133



$\frac{266 \times 5}{8 \times 16000} \times \frac{12}{1} =$ 2x2x¼.

$\frac{15960}{128000} =$

128000 / 15960.0 = 1.124
128000
316000
256000
600000
512

$\frac{532 \times 5 \times 12}{8 \times 1600} = \frac{31920}{128000} = .250$

[ON BACK OF PRECEDING PAGE]

24 - 20-
3
60$.

16-
3
48 - 60- .194

22-) 14.00
x 2
6 80
6 x 8
320

.233
60) 1400
120
200
180
20.

A	4.54		2 34		44
	5 11	15	2 43		9
	5 33	21	3 23		30
	5 56	23	4 02		39
	6.13	17	4 23		21
	6 19	6	5 02		39
	6 49	21	5 51		49
	6 45	5	6 11		20
	7.08	23	6 50		39
			7 23		33
	7 17	9	8 06		43
	7.25	8	8 50		44
	7 36	11	9 35		45
	7 44	8	10 13		44
	8 04	20	10 22		9
	8.13	9	11 24		62
	8 20	7			
	8 40	20			
	8 54	14			
					41
	9 55	59			
	10 55	2			
	10 59	4			
	12 00	61			
	12 38	38			
	12 46	8			
	1 50	64			

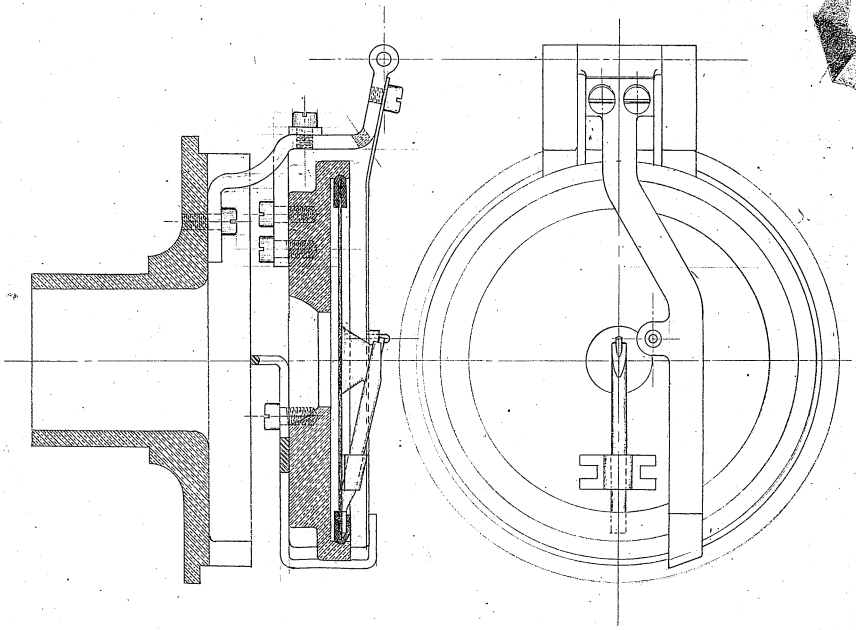
Weehawken to Jersey City
1 Hour
1 14 min Via Newark –

Most trains 1 hour

1 40 KWH, 1 hour 1 min
19 stops via Newark
14 stops Main Line –
115 Kwh "

No Trains, Via Newark 10 –
" Main Line, 31

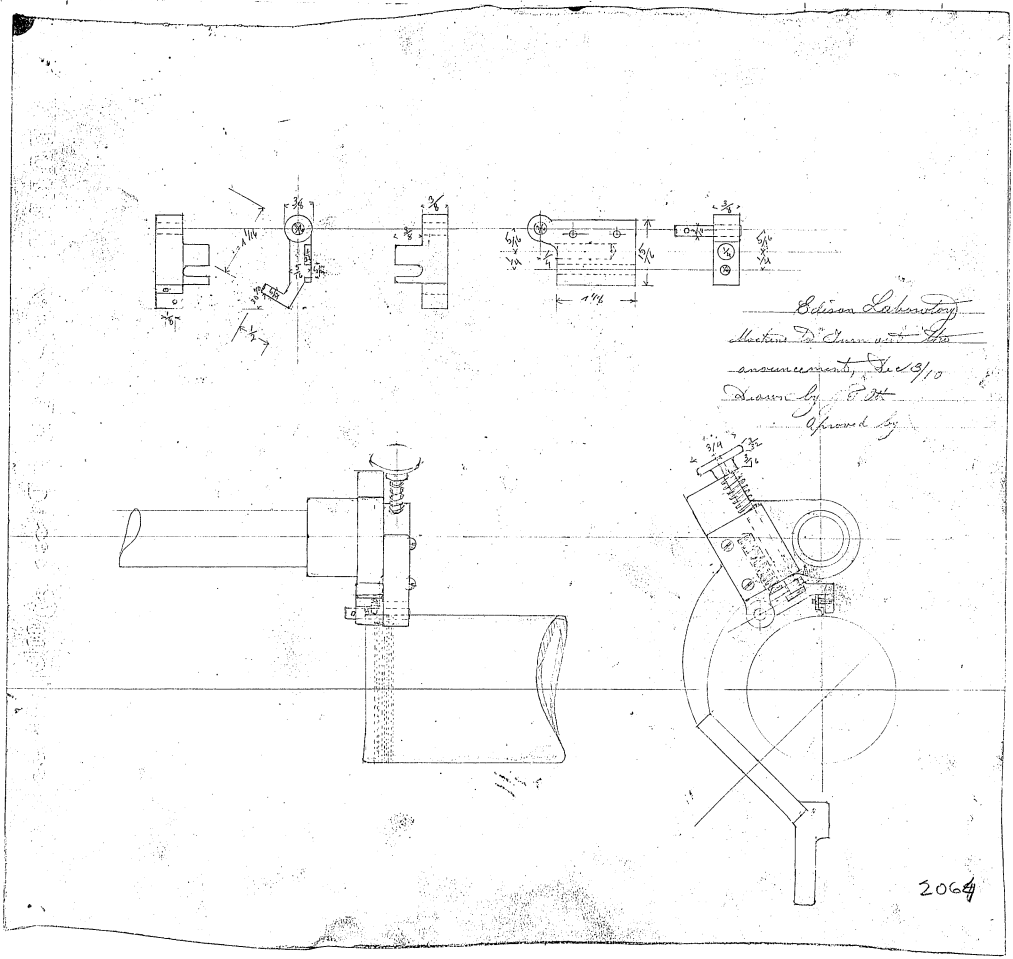
Pilot at Paterson

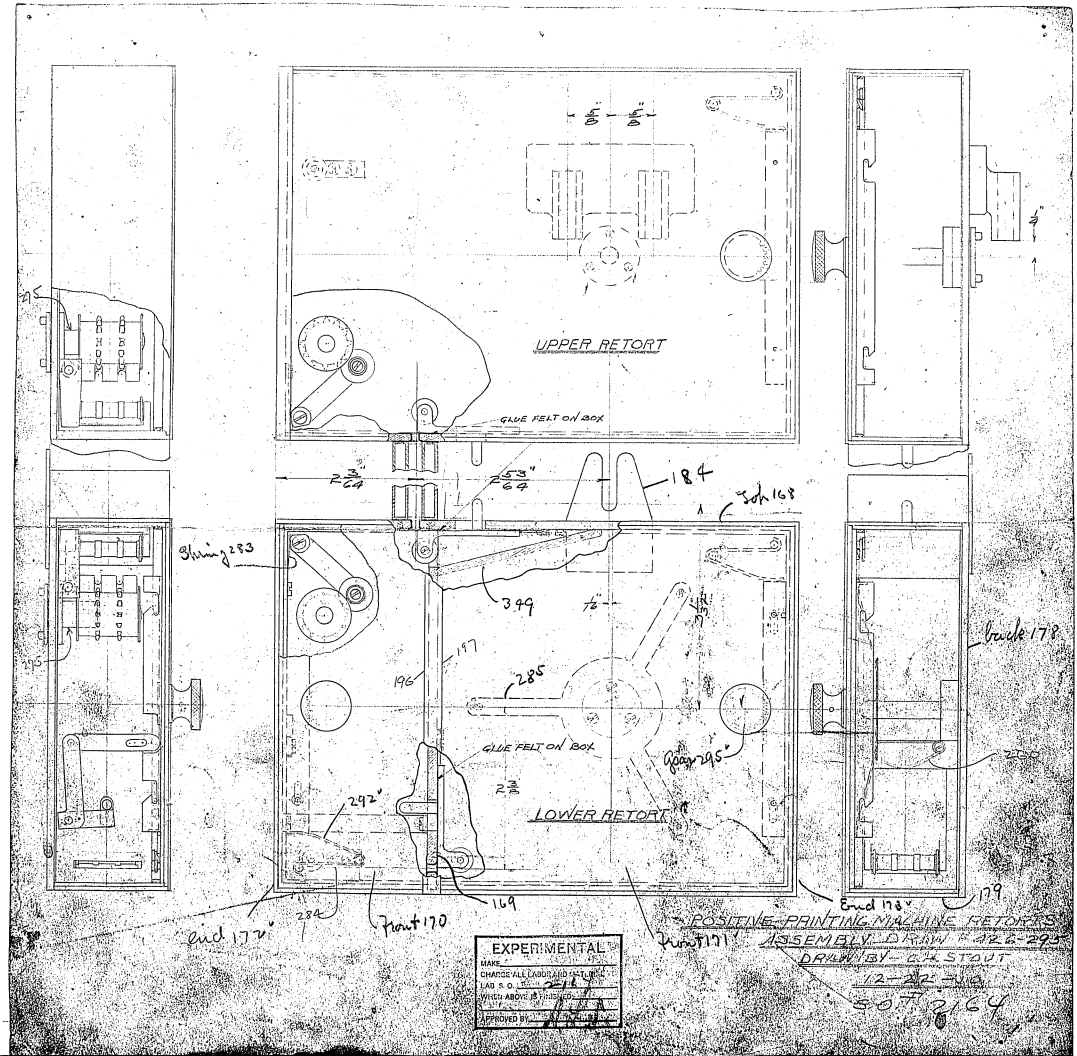


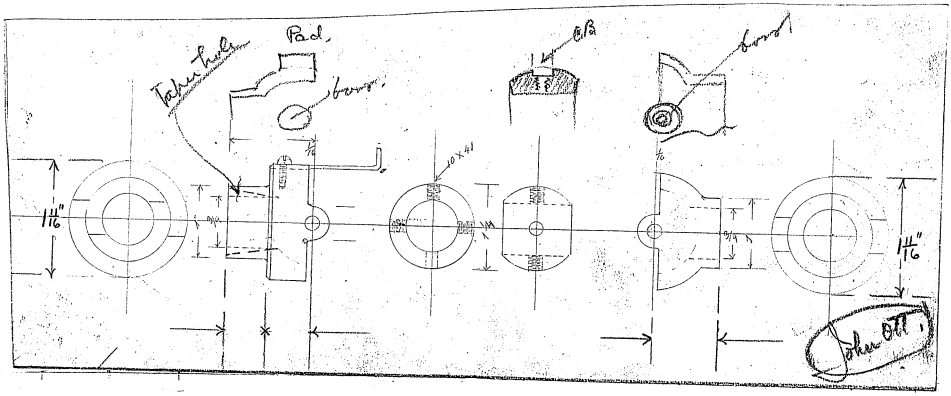
EDISON PHONOGRAPH WORKS

Nov. 8, 1910

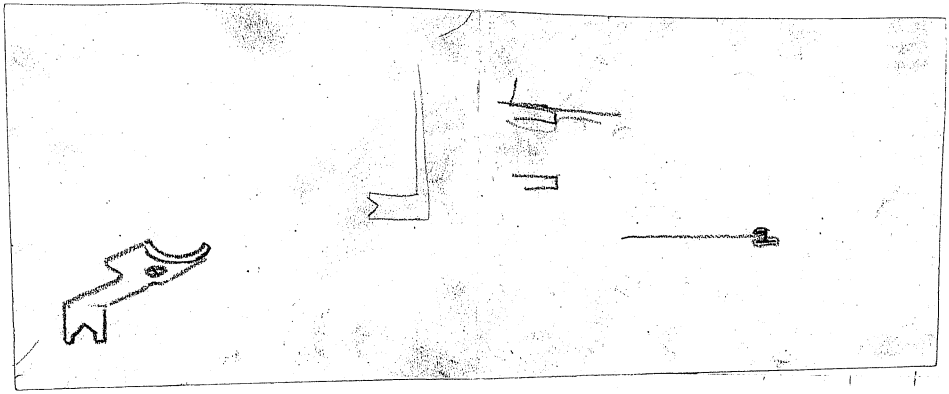
L. Reis.

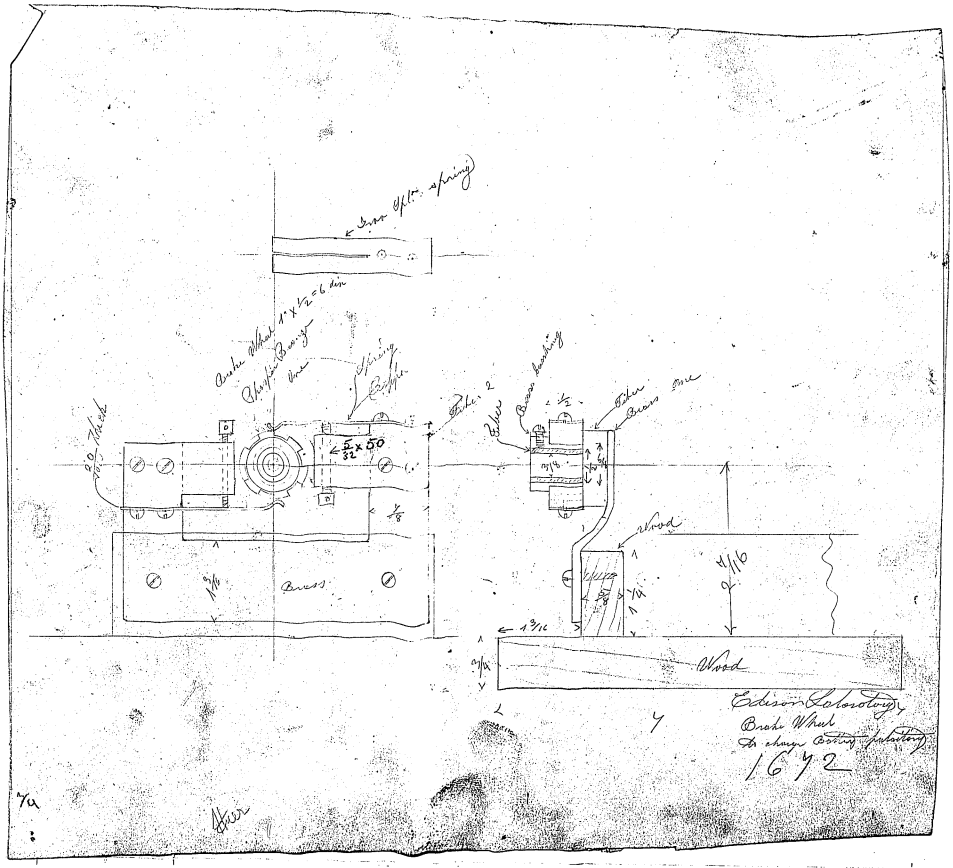

Edison Laboratory
Martin D'Imm
Dec 3/10
Drawn by
Approved by
2064


UPPER RETORT
GLUE FELT ON BOX
184
Lock 168
Spring 283
3.49
197
196
285
GLUE FELT ON BOX
Gear 295
LOWER RETORT
292
169
End 172
Front 170
Front 171
End 178
Back 178
179
POSITIVE PRINTING MACHINE RETORTS
ASSEMBLY DRAW 426-295
DRAWN BY C.A. STOUT
12-22-49
SOT 2164
EXPERIMENTAL
MARK
CHARGE ALL LABOR AND MATERIAL
LAB S.O.
WHEN ABOVE IS FINISHED
APPROVED BY

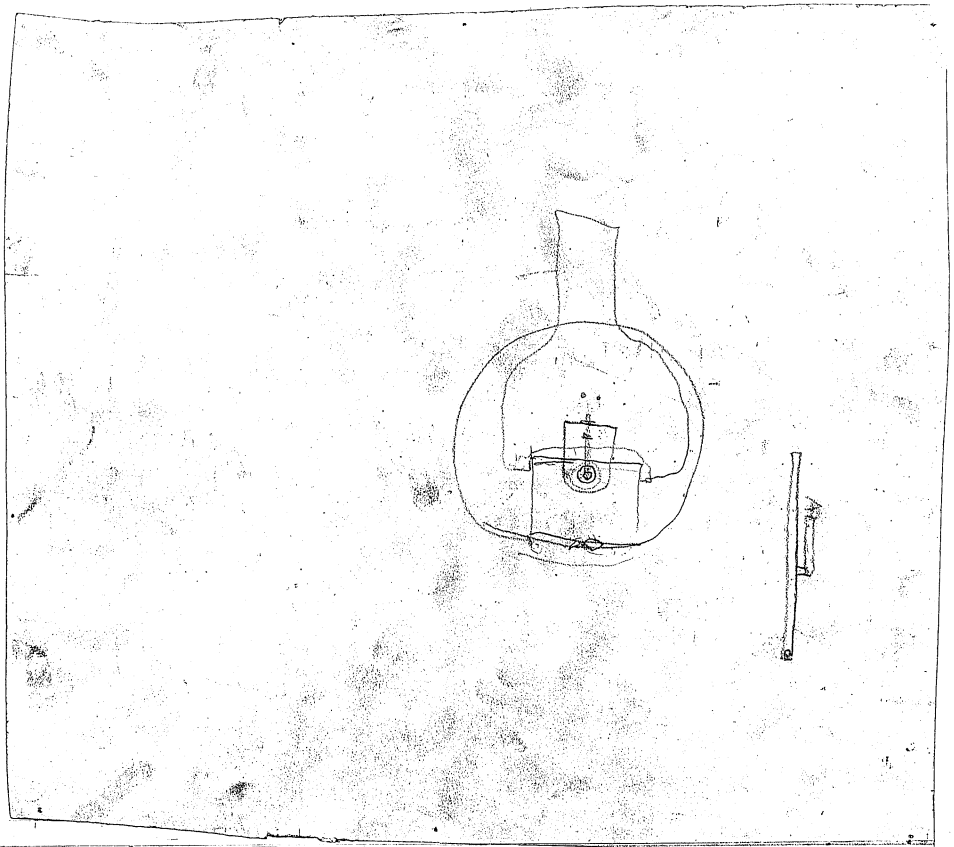

Pad
Tube Tube
brass
C.B
brass
10 x 41
1 1/16"
1 1/16"
John Ott

[ON BACK OF PRECEDING PAGE]




Brass Upl'ts. & spring
Arbor Wheel 1" x 1/2" = 6 dia
Shaft Bearing
Brass
Spring
Brass
Brass bushing
Brass
Brass
20 Thd
5/32 x 50
Wood
Wood
Brass
Edison Laboratory
Brake Wheel
To chap Coding Inventory
1692

[ON BACK OF PRECEDING PAGE]

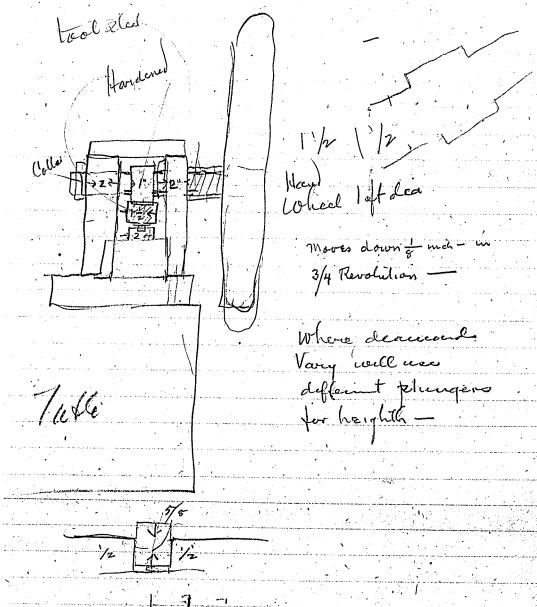


Unbound Notes and Drawings (Undated)

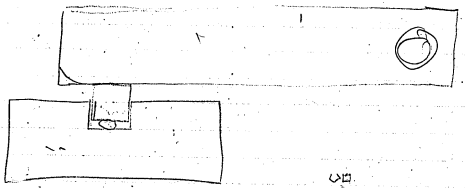
This folder contains undated notes and drawings, probably from the period 1899-1910. Included are items by Edison regarding storage batteries and the layout of a battery manufacturing plant. Also included are a group of drawings by Edison, found with the label "magnetometer descriptions"; an unfinished draft of a patent application for molded disc records; and a lengthy set of draft specifications and calculations by an unidentified employee.

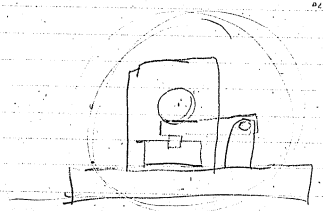
Approximately 40 percent of the documents have been selected. The items not selected consist of material by experimenters other than Edison.

[FOUND IN FOLDER: "MAGNETOMETER DESCRIPTIONS"]

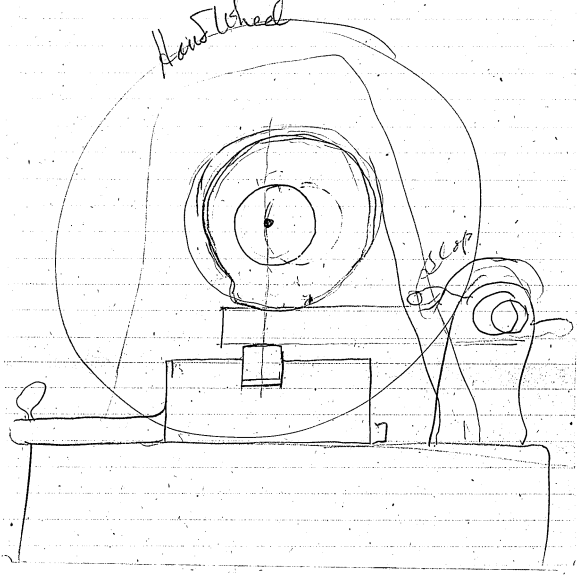


[FOUND IN FOLDER: "MAGNETOMETER DESCRIPTIONS"]





[FOUND IN FOLDER: "MAGNETOMETER DESCRIPTIONS"]



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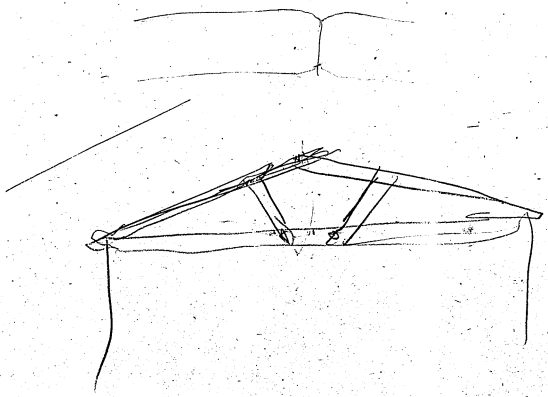


Phono

file sketch

The object of this invention is to produce a phonographic record in metal whereby the wearing qualities of such records shall be increased & also to render audible the very weak overtone vibrations which in a soft record are generally worn away very quickly by the reproducing mechanism

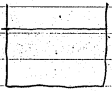
One form of
The invention consists in producing a sound record in wax upon a flat disk in the form of a Volute spiral coating the whole of the surface of the record with a conducting film preferably by the vacuum process described in my patent ——— upon the film is a heavy plating of ——— Nickel ~~or Copper~~ preferably Nickel about 1/32 of inch thick upon this is plated Copper to extent of 1/8 inch. The Matrix after the opposite face to the record is turned true is placed in a cylinder having a bore almost equal the diameter of the matrix, over this is placed a sheet of polished metal preferably steel about 3 to 4/1000 of inch thick, on top of this is placed a disc of very soft Rubber about

1/2 inch thick a piston then replaced on top which ~~the piston is placed~~ the whole is placed in a hydraulic press and the piston subjected to a pressure of many tons according to the size of the record. The pressure acting upon the rubber causes the thin sheet of metal to be forced into the sound record ~~the rubber~~ producing a perfect copy of the record on the matrix. Rubber being practically non-compressible acts like water in a hydraulic press. The record is then removed & other inserted thus giving an almost unlimited multiplication of copies. ~~The first step is completed for~~ ~~Nickel~~ The nickel surface of the ~~Die~~ matrix is very hard but if desirable iron can

(1)

5 ft tank Equivalent to 180 15ft inches consumption
grids 1 ft apart - 15 in acid - 1 Rev 10
minutes, 6 hours 8 hours 48 Rev -
15 to Rev - 48
10
480
48 cells per day A4 -
12
This is Enough — One man does it

Woodrack holding grids in present tank
128 A4 grid - 3 days with glycerine - with
a little alkali — This is drawn off
& a very weak alkali solution put in
& boiled 3 days - Then Removed
put in racks being hot will be dry
over night -



in reduction tank when empty
the water is put into it up to
a certain mark - Then a
Certain number of liters
of glycerin put in &
Rack holding A4 is lowered
& boiled for 3 days

present tank is 5X5 -

Cools in tank No good, wants tanks with steam bottoms,

Wood (Maple) racks to hold grids -

Raise up & lowered or transferred on a Run way 1 ft water above The grids -

Should have a ~~remarkable~~ ~~for~~ to condense steam as far as possible, remarkable with the Rack -

Tanks set up from ground so can have 2 feet under to repair outlet which should be on bottom, bulged to permit all the solution to run out,

(3)

for dipping parts,

Dip 12 grids 5 minutes in 30% H_2SO_4 wash with water then dip in 50% Ammonia to get rid of acid in pores - then wash & dry over hot plate - ~~[illegible]~~

Tie together with fine Iron wire & take over to storage battery & have them put in a pot with Regular stuff & run thru the Hydrogen -

Another Experiment

Take 12 worst grids do same thing as above - after drying plate metal on each seperately. using 10 amperes for 5 minutes - wash & dry

2

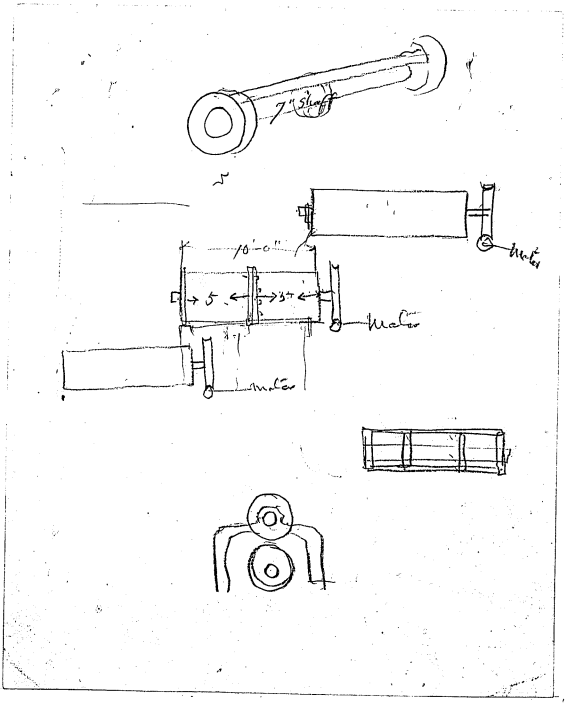
by hanging over hot plate
then bundle them together
& take over to SB & have
them put them one of
their runs in hydrogen

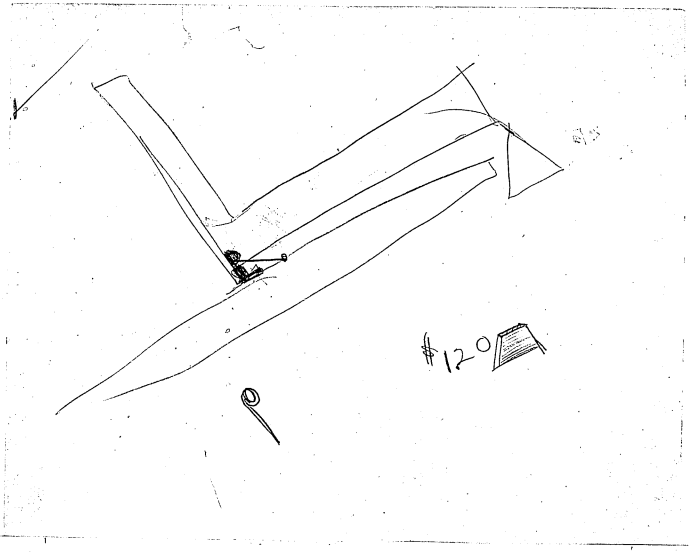
80 Rear view
Arduino

Ralph C. Broquet

Have me couple drums
of your 60% product
Sulphate Soda.
Send over for test
on new air
Evaporator.

Edison


7" Shaft
10'-0"
5
3"
Motor
Motor
Motor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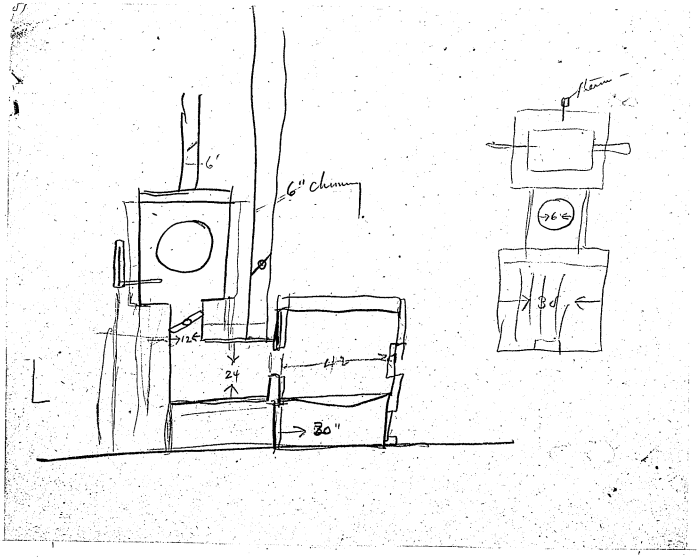
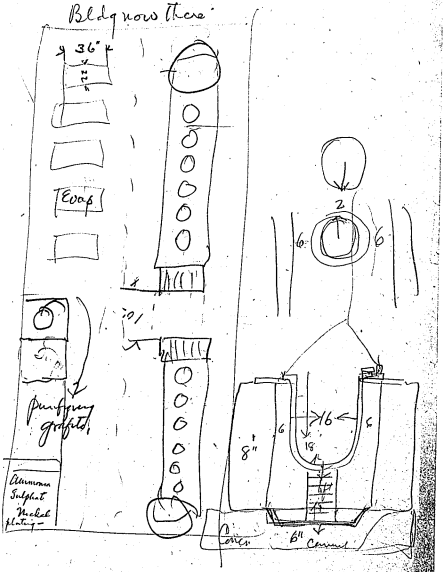
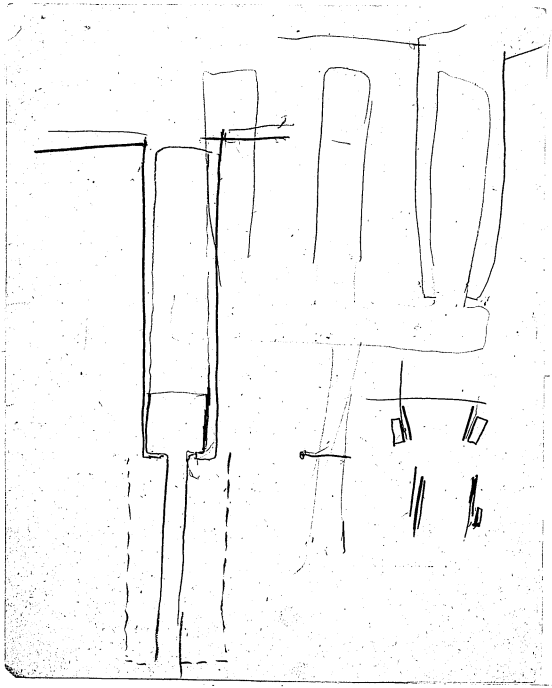
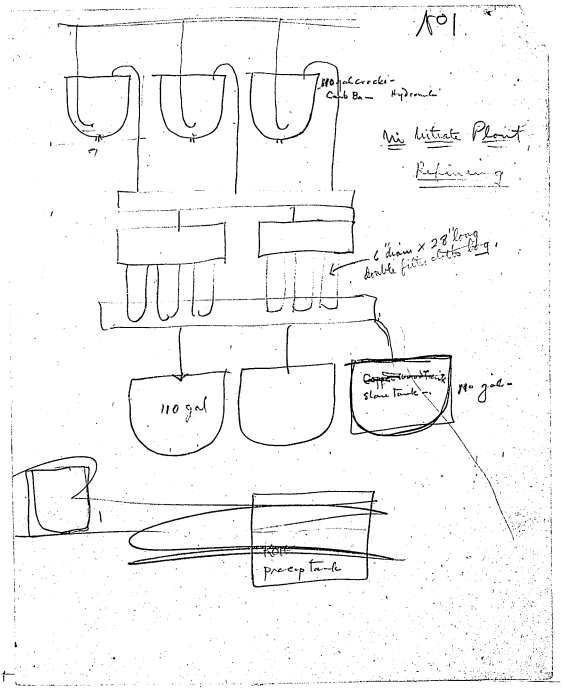

6'
6" chimney
12
24
42
30"
plenum
96
30


Bldg now there
36"
Soap
Ammonium Sulphate Nickel plating
Purifying graphite
2
6
6
6
16
6
8"
18"
6"
Concrete

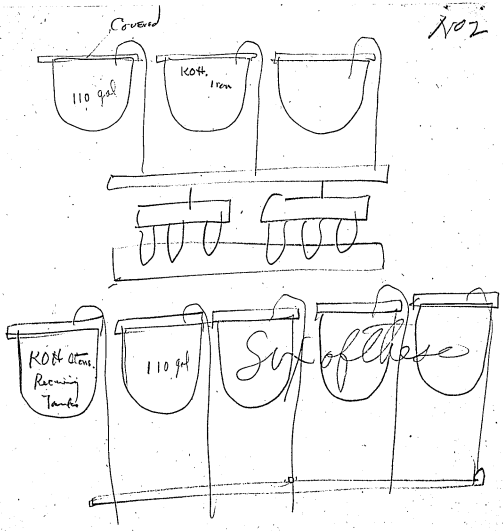
[ON BACK OF PRECEDING PAGE]



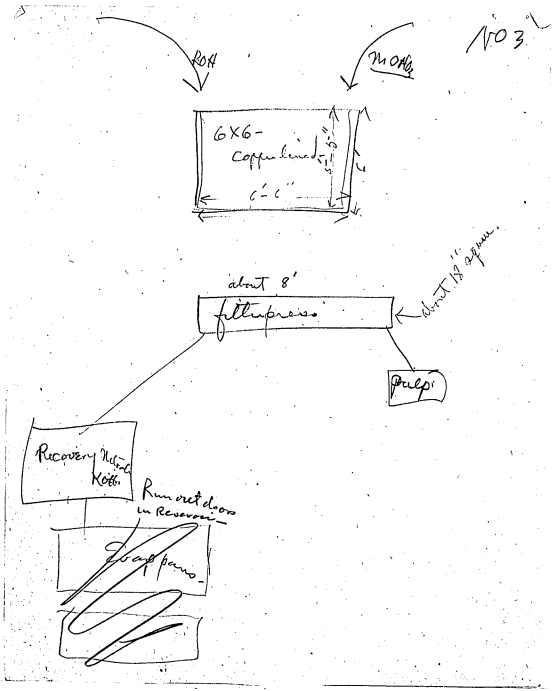
101


110 Nakerocki-
Calb Ba — Hydromile
Ni Nitrate Plant
Refining
6" diam x 28' long
double filter cloths
110 gal
~~Copper Lined Tank~~
steam tank
110 gal
precip tank

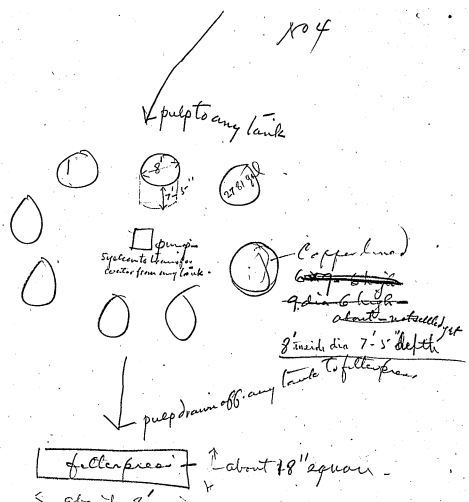
No 2

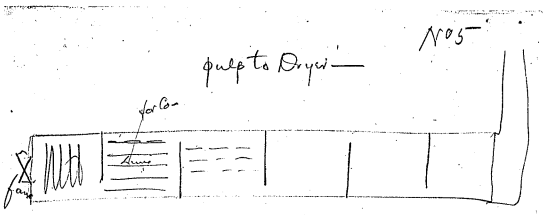

Covered
110 gal
KOH. 1 ton
KOH Concs. Receiving Tanks
110 gal
Six of these

No 3

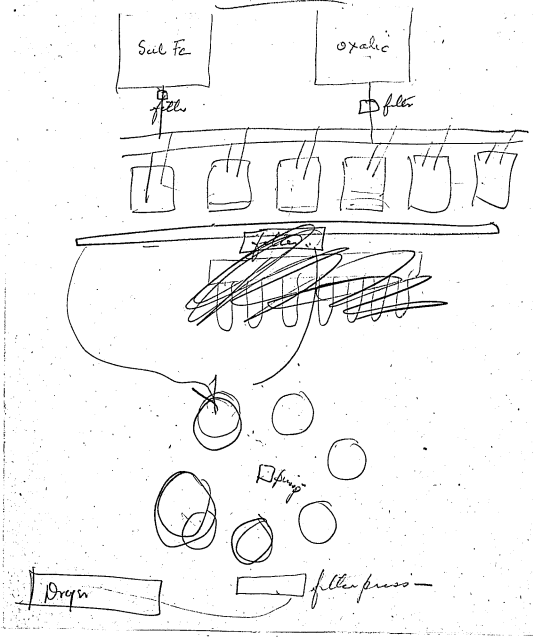

ROH
MOH
6X6-
Copper lined
about 8'
filtrpress
about 18" square
pulp
Recovery Metal Kettle
Run out door in Reservoir

104


pulp to any tank
8'
7'-5"
pump
Suggested to move to center from any tank.
(Copper lined)
~~9 dia 6 high~~
~~about 7 feet~~
8' inside dia 7'-5" depth
tank to filter press
pulp drains off any
filter press
about 18" square
< about 8' >


No 5
pulp to Dryer
for Co-

Oxalate Fe



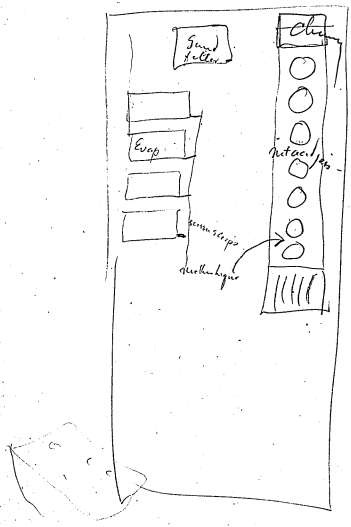
Chief Tombola

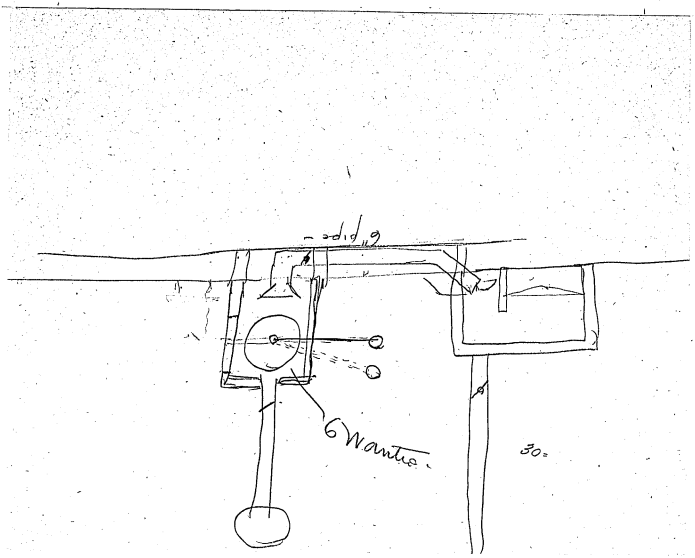
Required –
Surface Cardamen

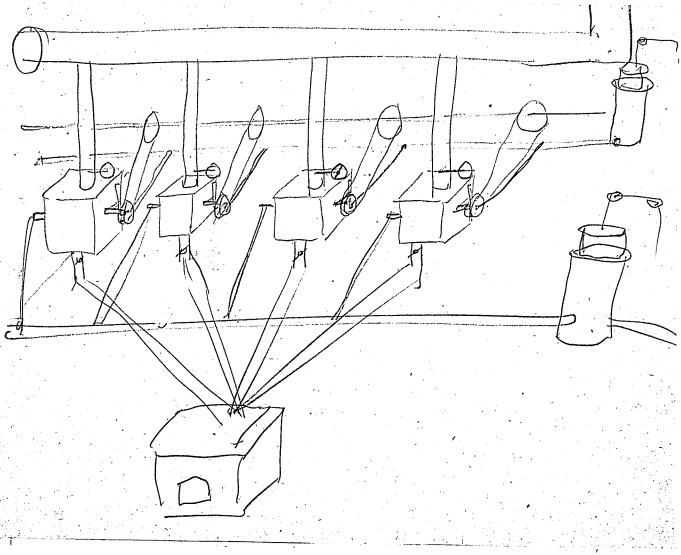
Distilled Water
10000 –

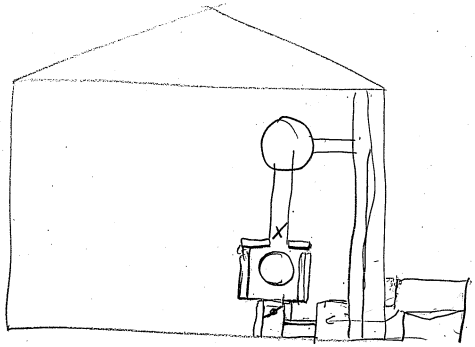
Deionized Water
10000

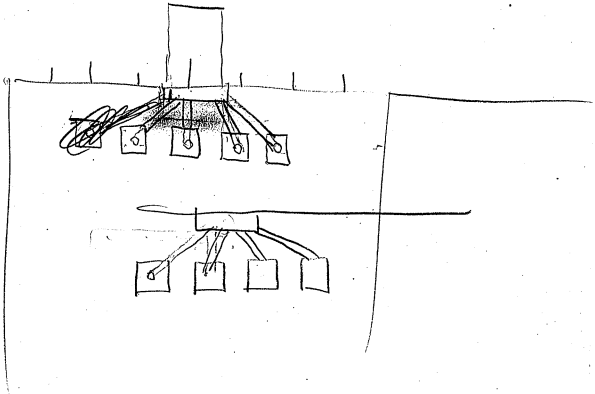
Islande Bldg —

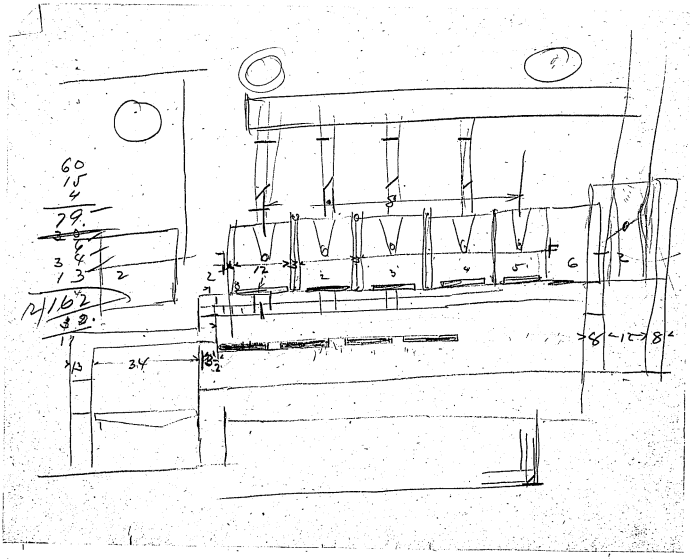


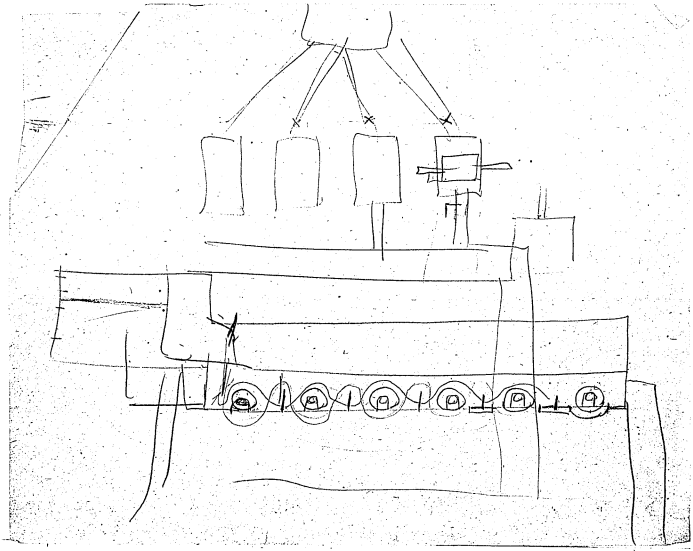

6 Wanted.
30.

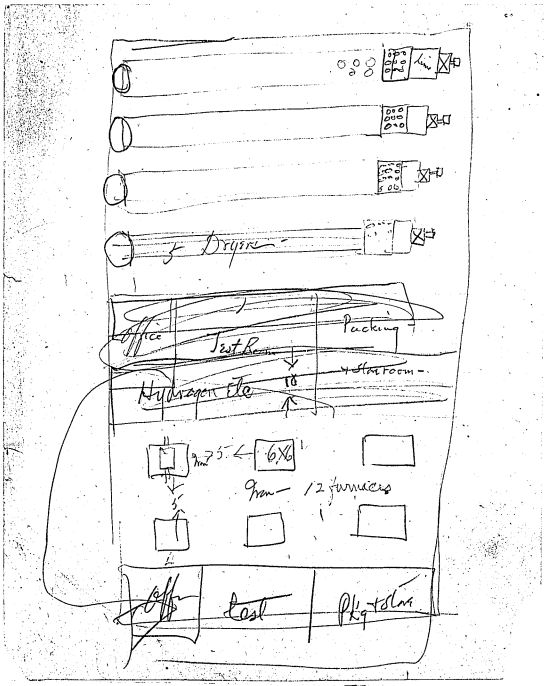


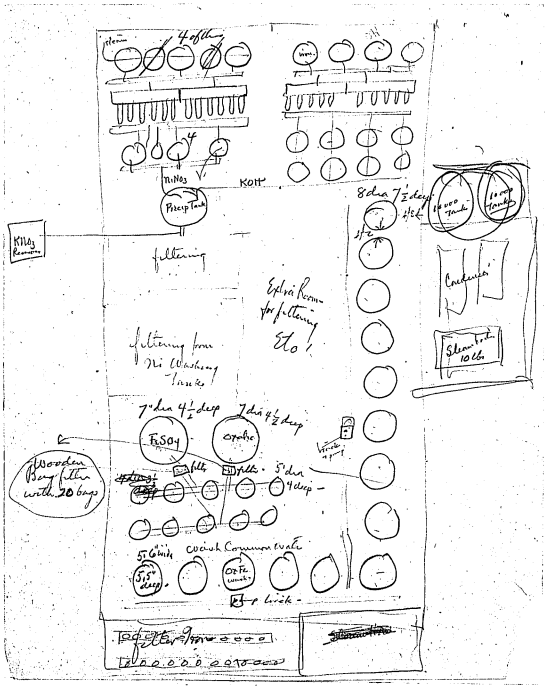


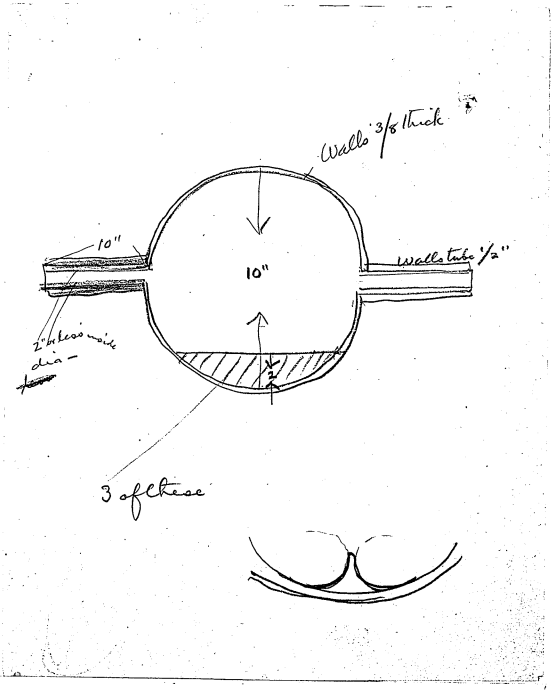


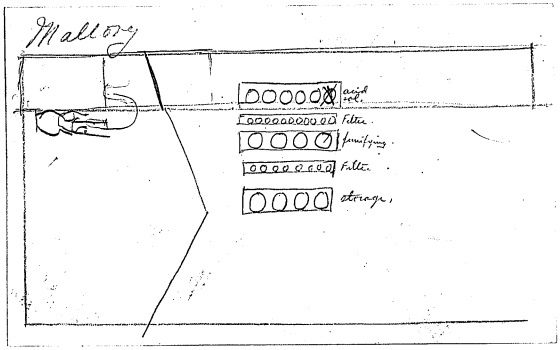

60
15
4
79.
34
13
2
12/162
34.
34
8
12
8

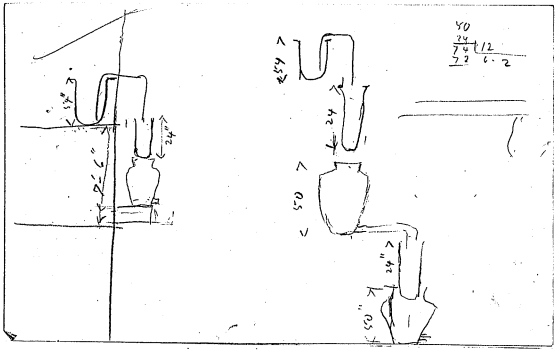


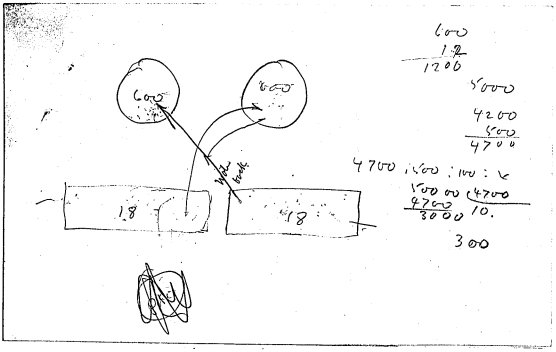

Lab
Drying
Office
Test Room
Packing
Hydrogen Etc
Washroom
6x6
9mm
5'
9mm
12 furnaces
Office
Lab
Pkg + Ship

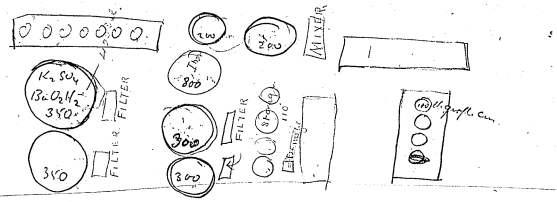

Steam
4 offtake
Water
HNO3
KOH
Precip Tank
KNO3 Recovery
filtering
8 dia 7½ deep
Hood Tank
Hood Tank
Crucibles
Shower 10 lts
Extra Room for filtering Etc!
filtering from Ni Washing Tanks
7" dia 4½ deep
7 dia 4½ deep
FeSO4
oxalic
Wooden Bag filter with 20 bags
filt
filt
5" dia
4 deep
5 6 inch
Co Ni Commercial
5½" deep
Co Fe Lunch
brick
filter


Walls 3/8 thick
10"
10"
walls tube 1/2"
2" brass rod
dia -
3 of these


Mallory
acid sol.
Filter
fumifying
Filter
storage.


50
24
74 12
72 6.2


600
650
1.8
1.8
600
1.2
1200
5000
4200
500
4700
4700 : 100 : 6
1500 00 (4700
4700
3000 10.
300



193 ! 65 = x ! 300

300

$\frac{17900}{620}$ | 65

880

$\frac{580}{700}$

890 . 700

15

44500

890

133,500

700

126,500

$\frac{126,500}{1200}$ | 300

$\frac{420}{14}$

$\frac{650}{600}$

500

500000 | 6000

8000

20,000

83

6000 | 3700

3700

300

1 15

84

3

252

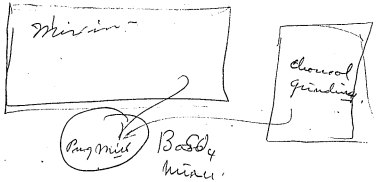
400

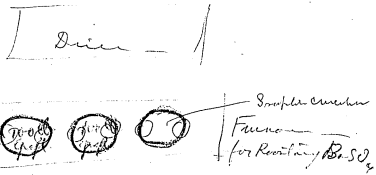
24,00

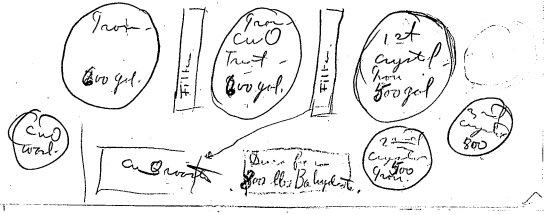
3

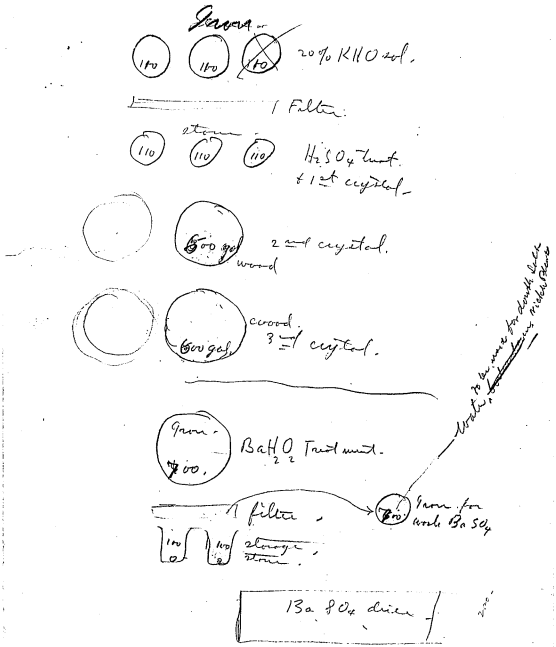
2,00

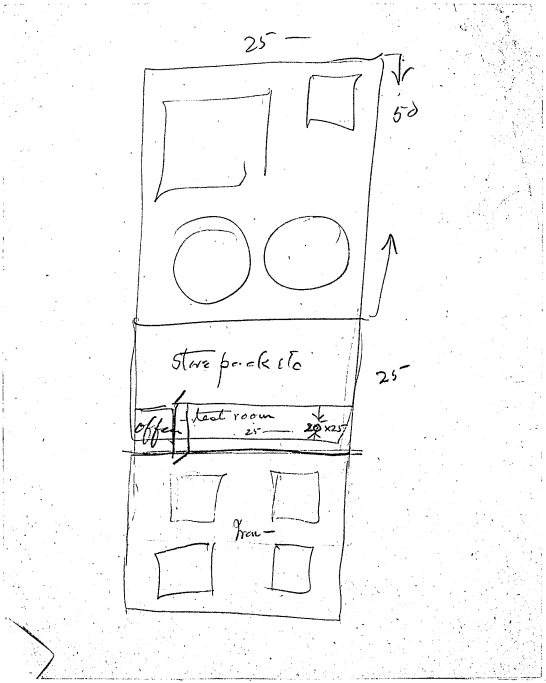
24

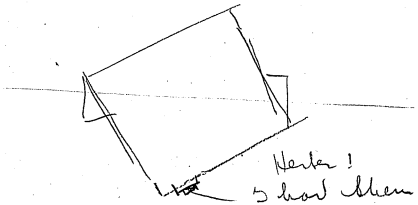

Mixing
Charcoal Grinding
Ball Mill
$BaSO_4$ Mixer.


Sample Crucible
Furnace for Roasting $BaSO_4$


Iron
500 gal.
Iron
CuO
Trust
500 gal.
1st
Crystal
from
500 gal
CuO
Trust
CuO
500
Crystalline
Guano
500 lbs Barytes.

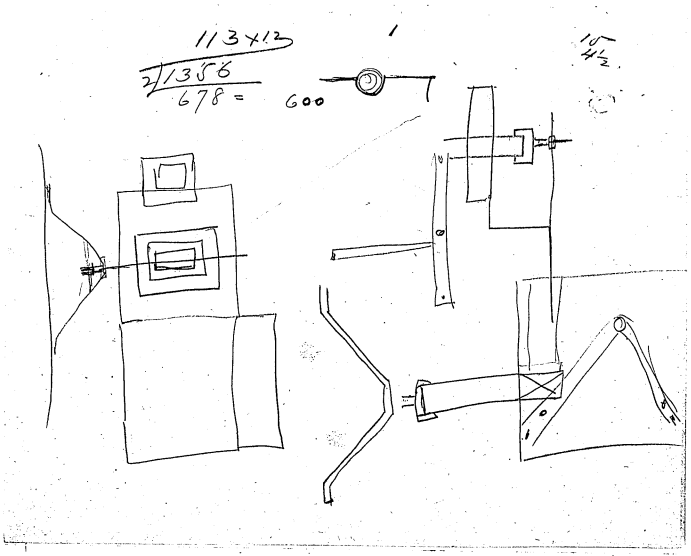

Gauze
110
110
110
20% KHO sol.
Filter.
110
110
110
H_2SO_4 treat.
& 1st crystal.
500 gal
2nd crystal.
wood
500 gal
wood
3rd crystal.
9 mm.
BaH_2O_2 Treatment.
filter.
110
110
Mother liquor to be used for dissolving barite
9 mm for work $BaSO_4$
$BaSO_4$ dried


25'
50
Store pack 150
25'
office
test room
25'
20x25'
Front



Herter!
I show them change the position of the plug. as shown here — Ralph.

[ON BACK OF PRECEDING PAGE]



Unbound Notes and Drawings
Oversize Documents

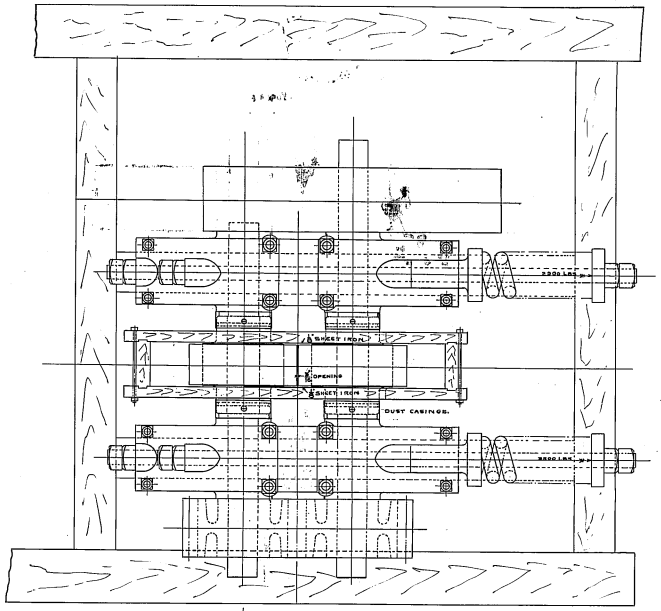
Among the unbound technical notes and drawings for the period 1899-1910 are many oversize blueprints, linen drawings, and sketches by draftsmen and other Edison employees. Included are plans for machinery, tools, patterns, and parts, as well as several Edison products, like the Home Phonograph (1900) and the Edison-Saunders reheater for compressed air (1899).

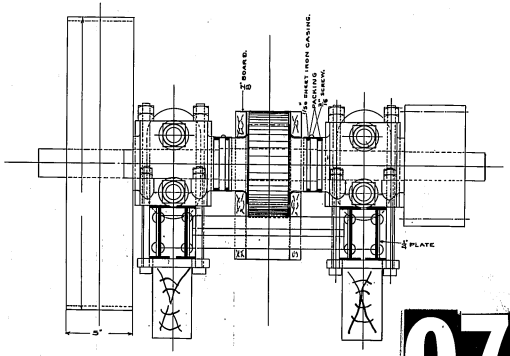
Less than 10 percent of the documents have been selected. The six selected items consist of experimental drawings from 1900 and 1910 reflecting work at the laboratory, including experiments with phonographs and motion pictures in 1910. Most of the unselected items relate to the manufacturing processes of Edison's companies or involve unidentified laboratory work for which little context is available and for which the drawings themselves provide only fragmentary details. Also not selected are documents that are too large, brittle, or dark to reproduce legibly.

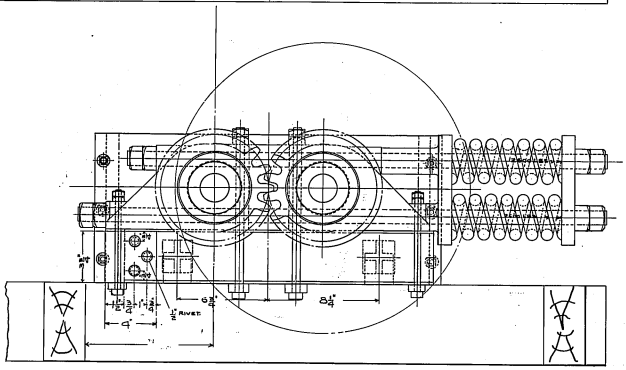
[FILMED IN SECTIONS]

1	2

[REDUCTION RATIO = 18:1]







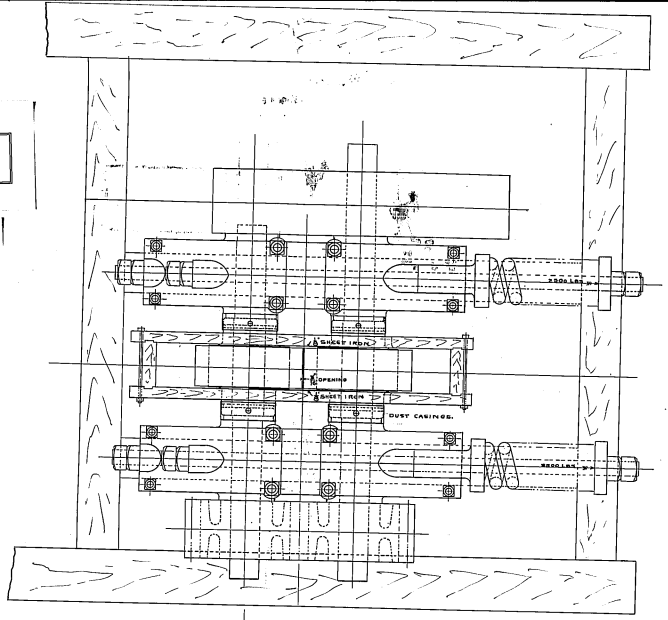
973

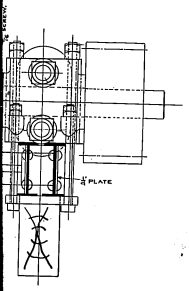
ORDER OR MFG.
908
-NUMBER-

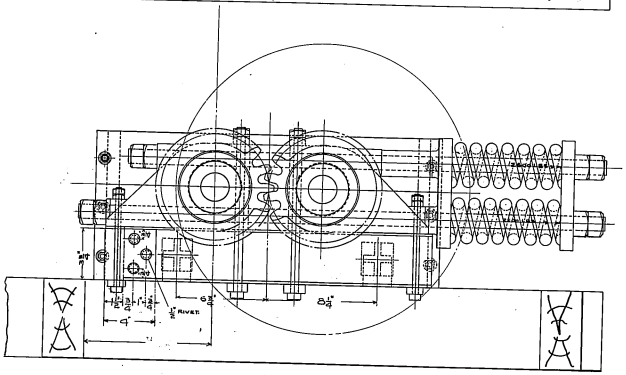
[FILMED IN SECTIONS]

1	2

[REDUCTION RATIO = 18:1]







974

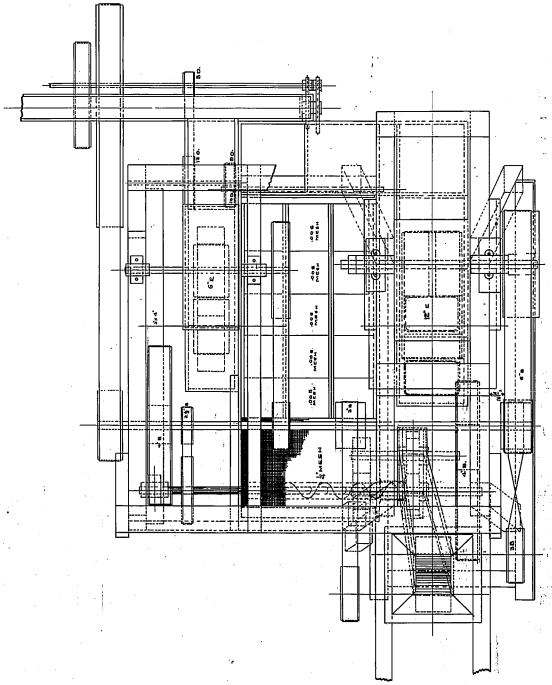
EDISON LABORATORY
WEST ORANGE N.J.
EXPERIMENTAL POWDERED FUEL PLANT.
CRUSHING ROLLS.
SCALE 3" = 1 FOOT
JAN. 30, 1900.
Geo. A. Fochs

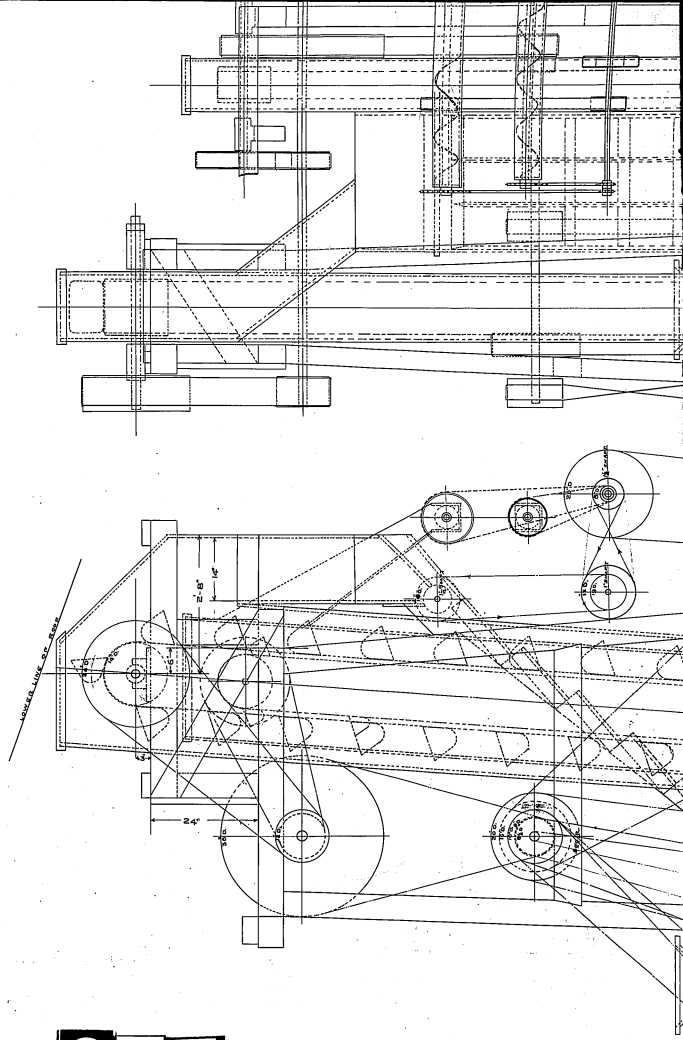
2.

[FILMED IN SECTIONS]

1	2

[REDUCTION RATIO = 18:1]





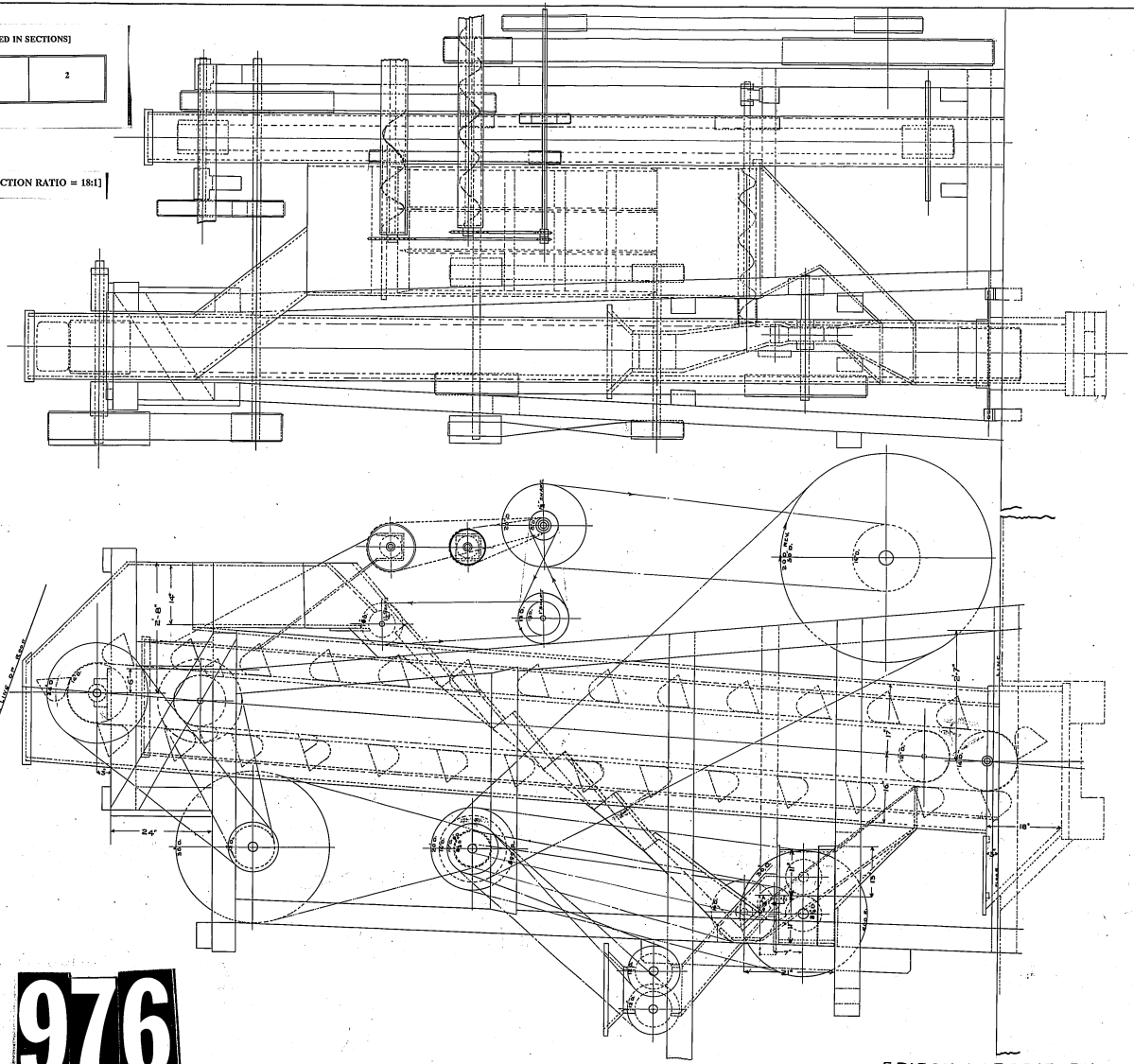
975

ORDER & MFG
9006.
NUMBER.

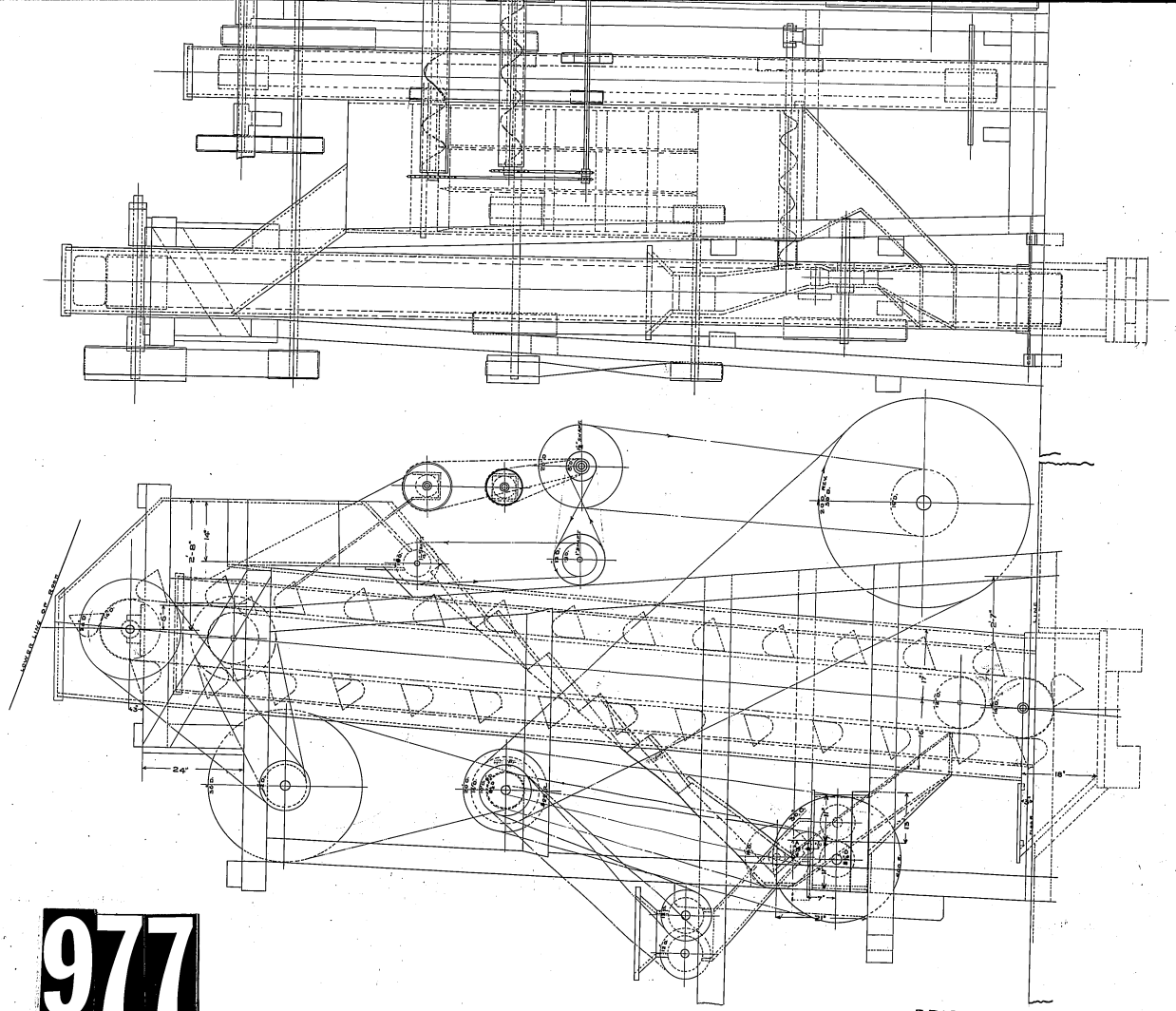
[FILMED IN SECTIONS]

1	2

[REDUCTION RATIO = 18:1]

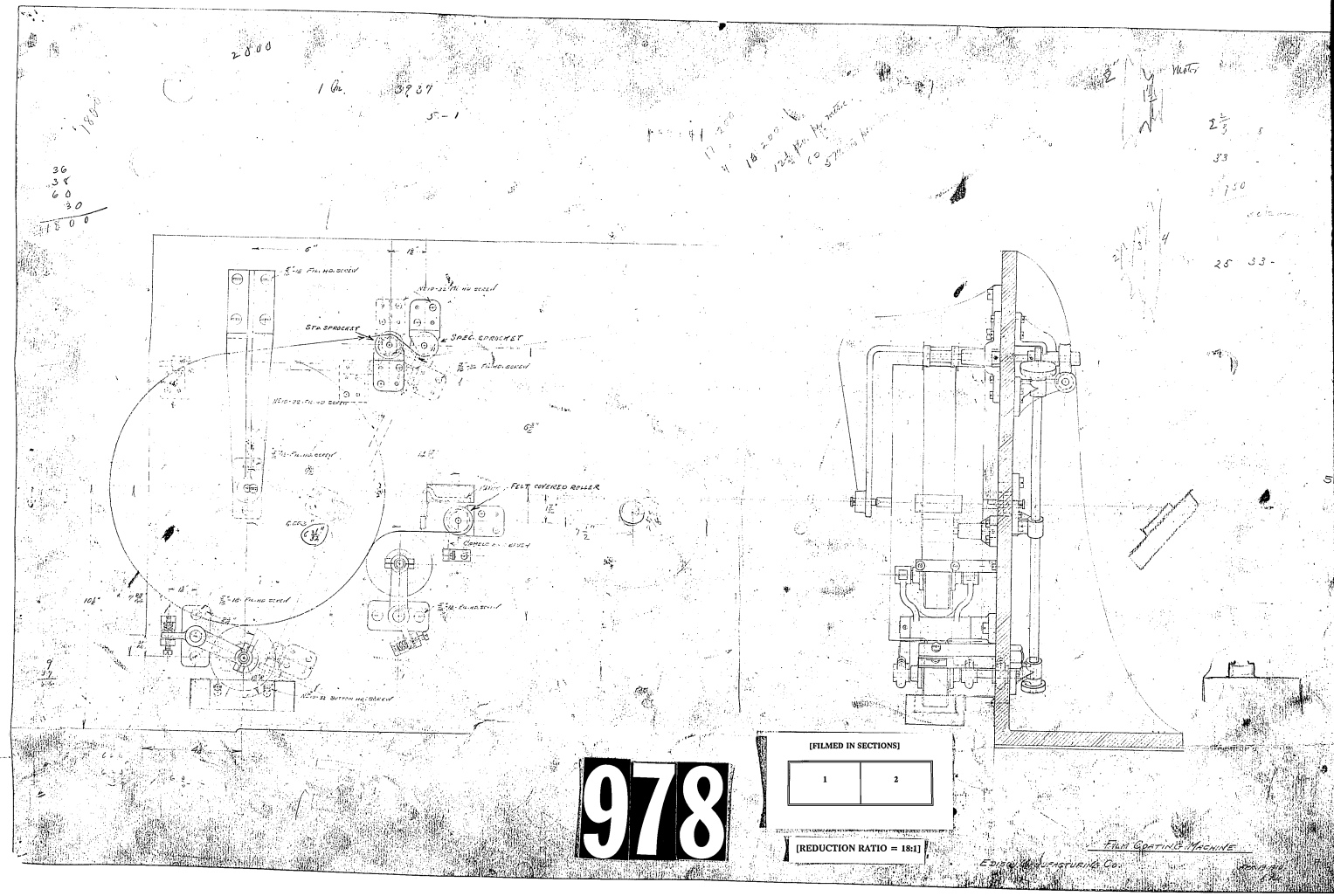


976



977

[REDUCTION RATIO = 18:1]

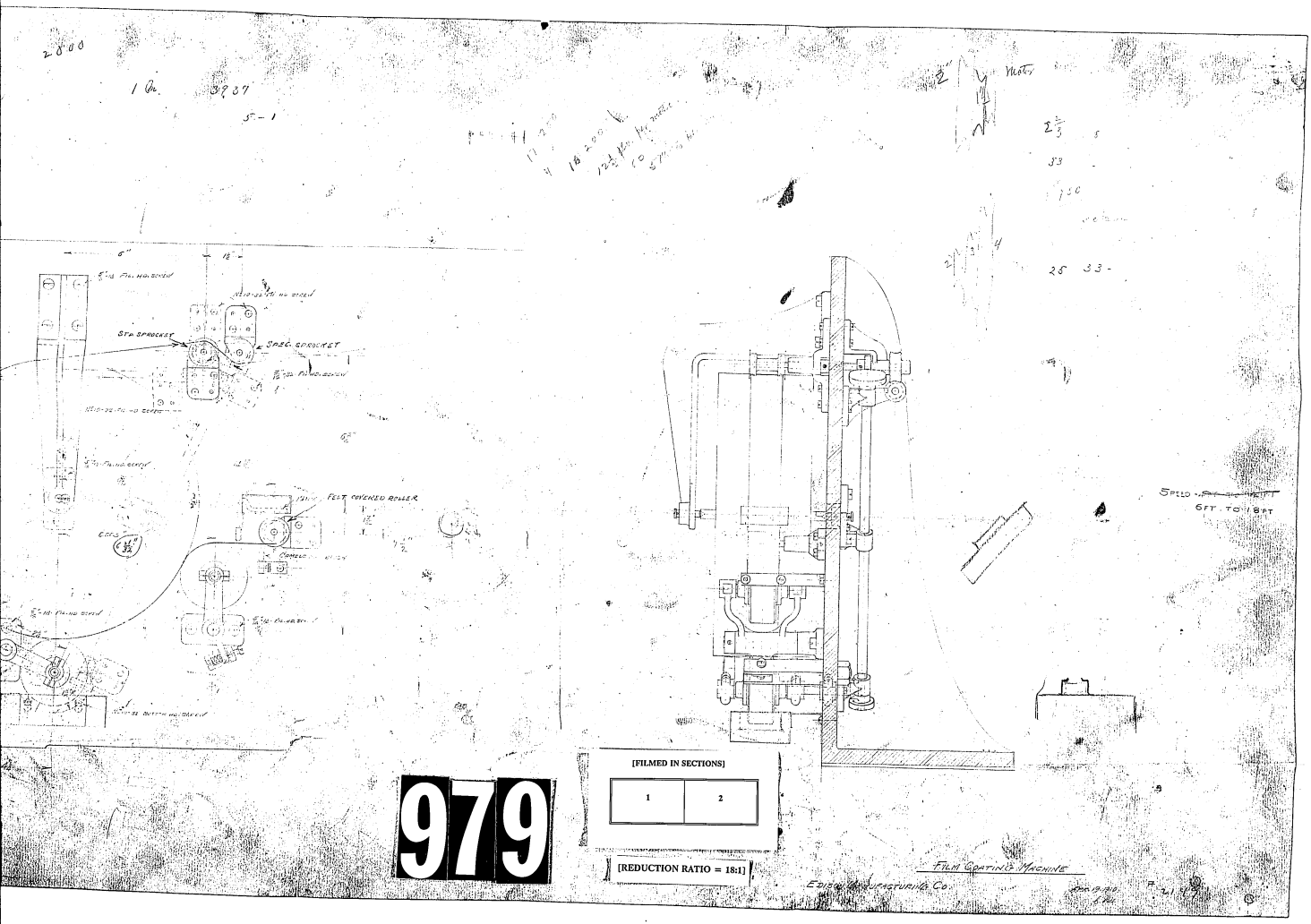


978

[FILMED IN SECTIONS]

1	2

[REDUCTION RATIO = 18:1]

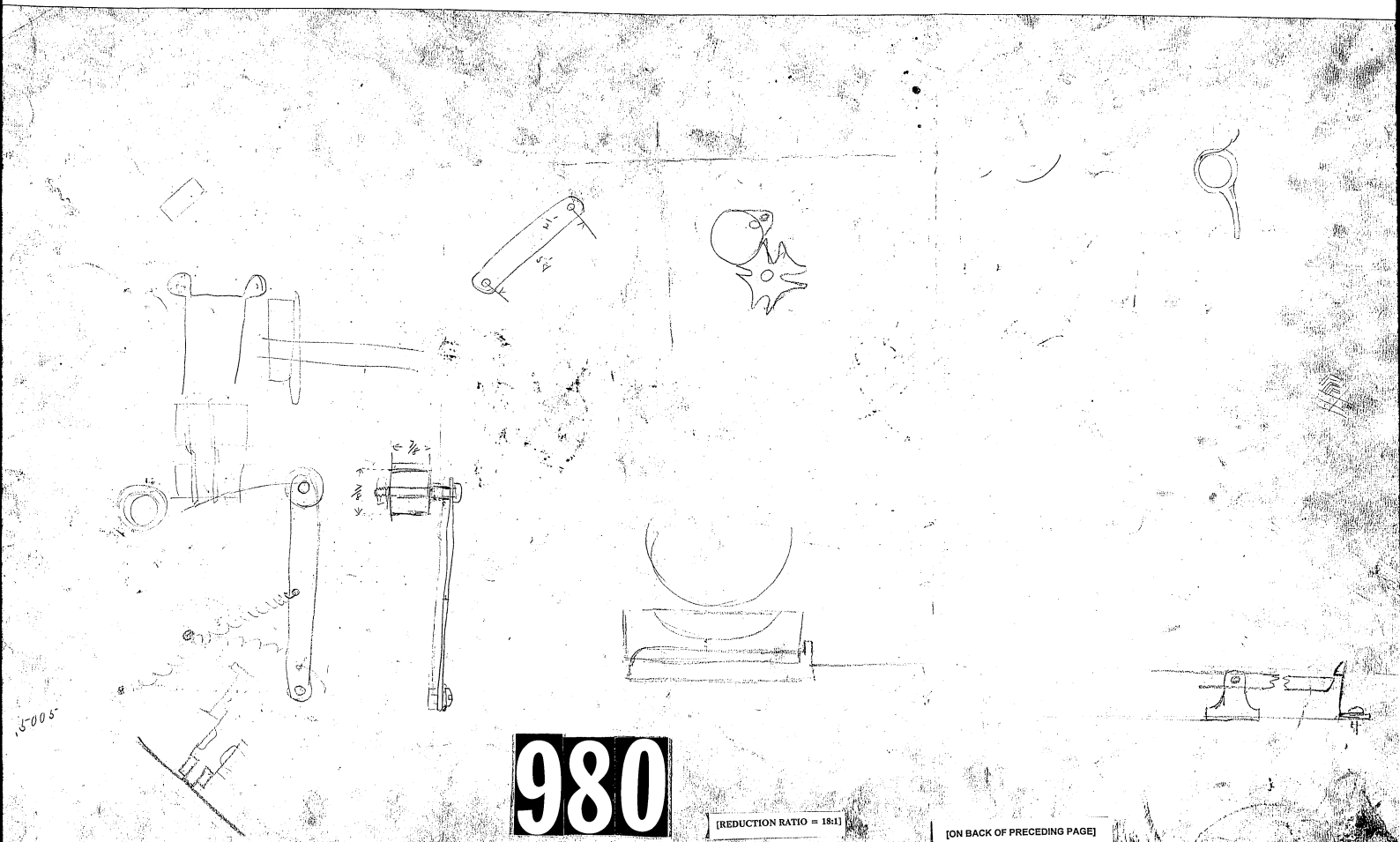


979

[FILMED IN SECTIONS]

1	2

[REDUCTION RATIO = 18:1]



980

[REDUCTION RATIO = 18:1]

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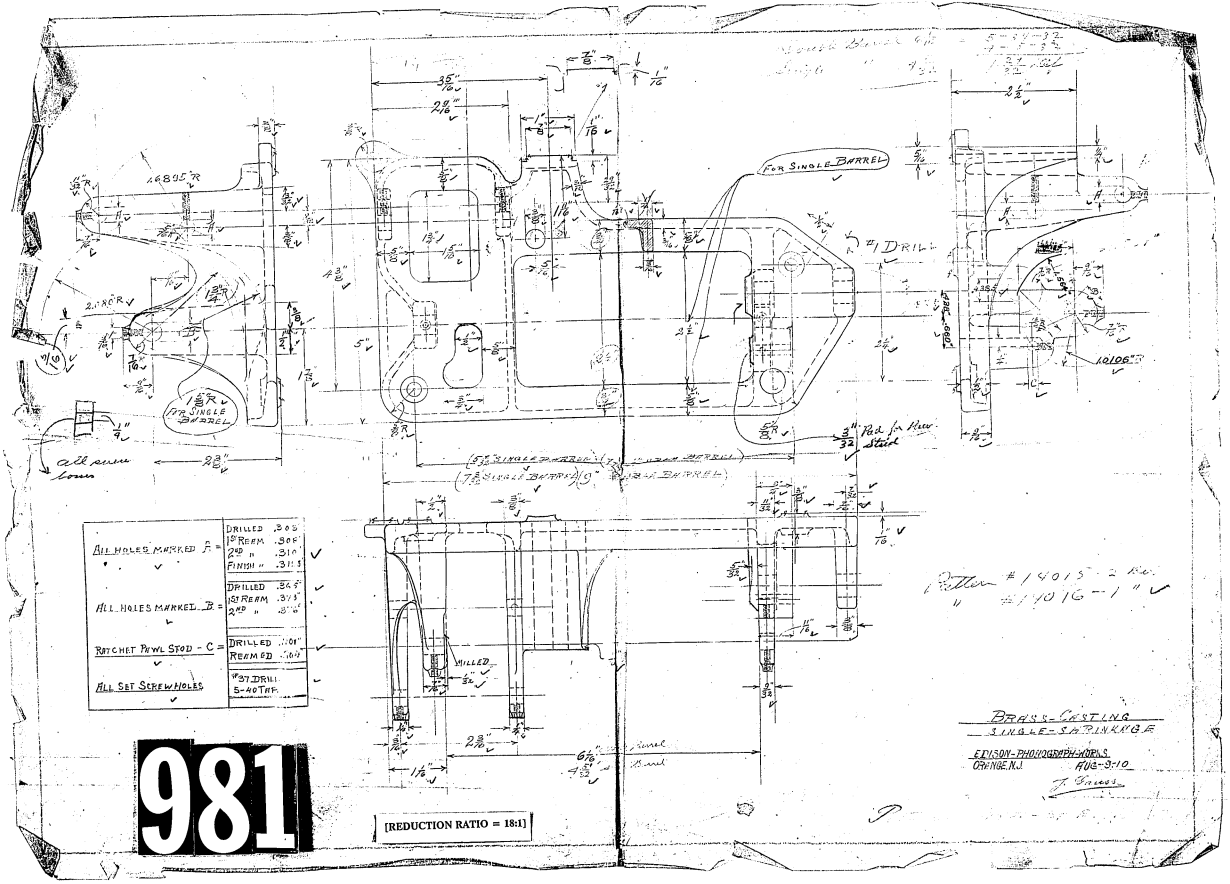
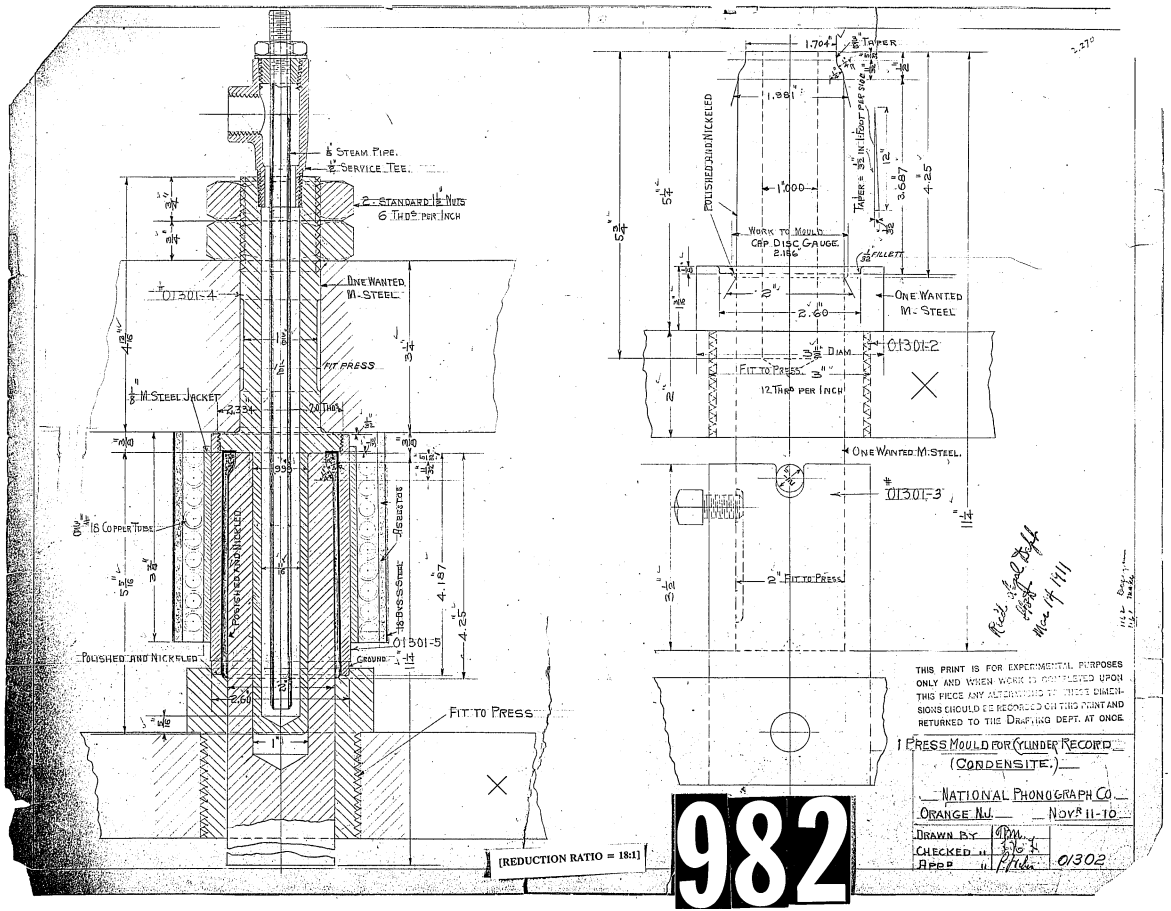
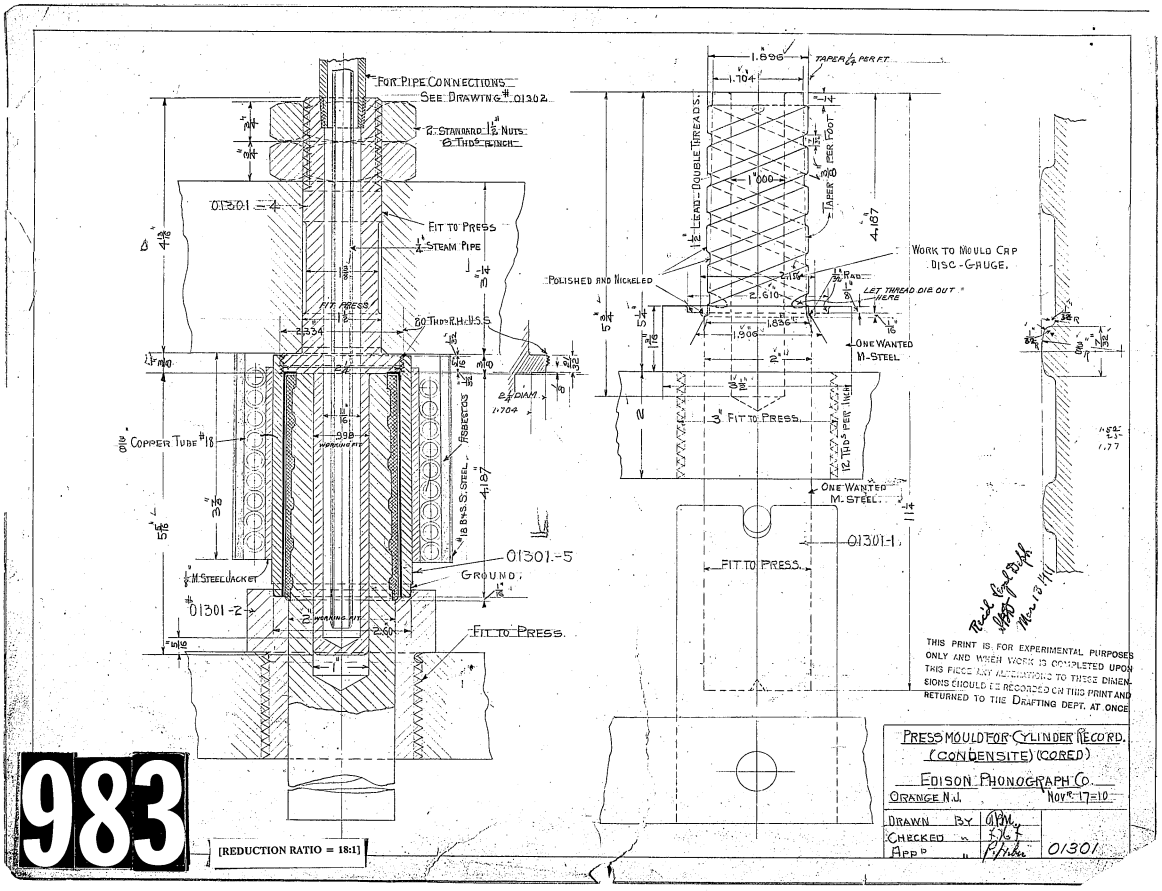


981

[REDUCTION RATIO = 18:1]


1/8" Steam Pipe.
1/2" Service Tee.
2 - Standard 1/2" Nuts
6 Thds per Inch
One Wanted M. Steel.
01301-4
Fit Press
M. Steel Jacket
2.334
20 Thds
1/16" 16 Copper Tube
Polished and Nickeled
Regulator
16 Brass Stock
01301-5
Ground
Polished and Nickeled
Fit to Press
1.704
1/8" Taper
1.981
Polished and Nickeled
1.000
Taper = 3/32 in. 1 Foot Pipe Size
3.687
4.25
Work to Mould Cap Disc Gauge. 2.156
1/8" Fillett
2.60
One Wanted M. Steel
01301-2
Fit to Press
12 Thds per Inch
One Wanted M. Steel.
01301-3
Fit to Press
Rect. Final Draft Approved Nov 17 1911
THIS PRINT IS FOR EXPERIMENTAL PURPOSES ONLY AND WHEN WORK IS COMPLETED UPON THIS PIECE ANY ALTERATIONS TO THESE DIMENSIONS SHOULD BE RECORDED ON THIS PRINT AND RETURNED TO THE DRAFTING DEPT. AT ONCE.
1 Press Mould for Cylinder Record (Condensite.)
National Phonograph Co.
Orange N.J. Nov. 11-10
Drawn by
Checked "
Appr "
01302
[REDUCTION RATIO = 18:1]
982

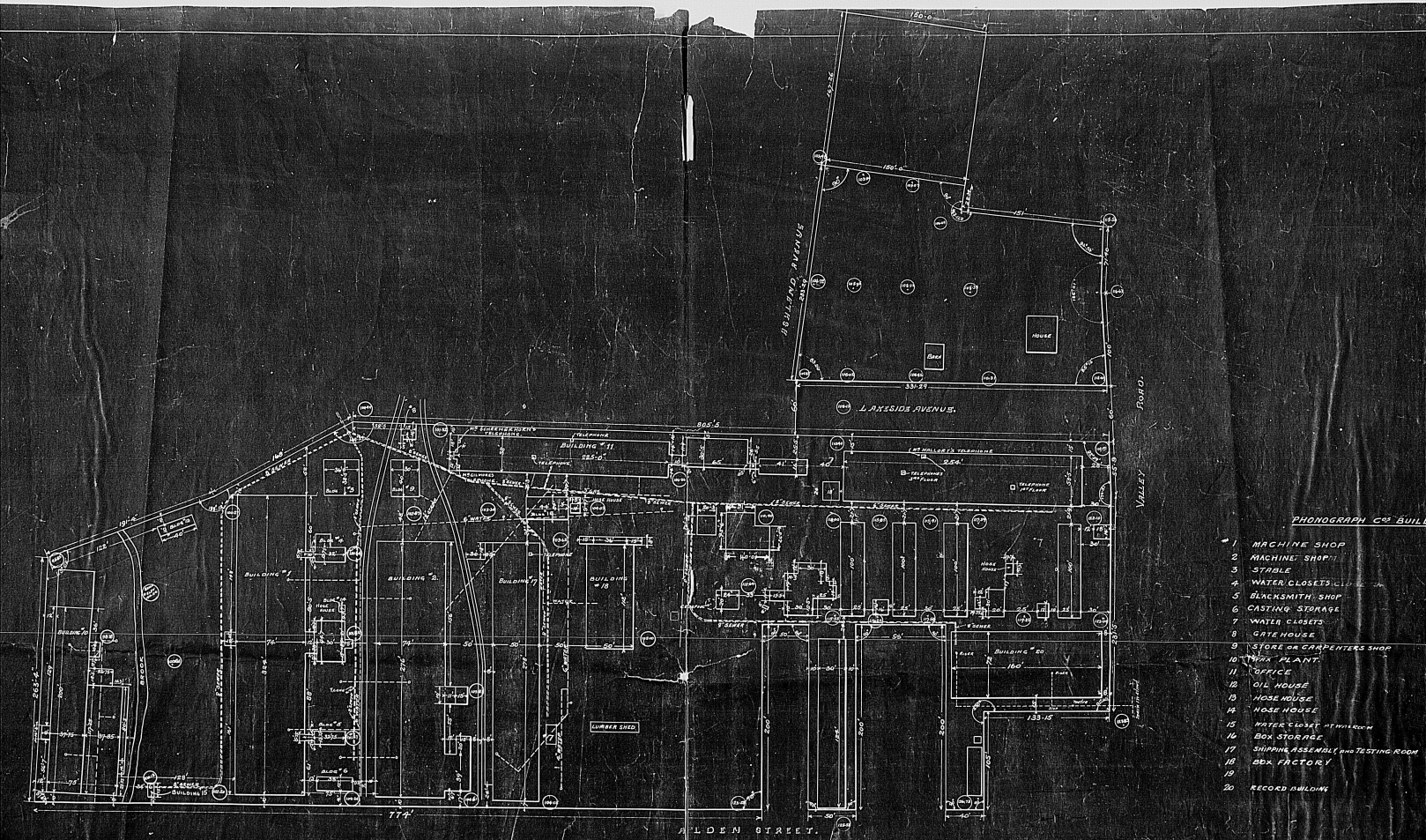

FOR PIPE CONNECTIONS SEE DRAWING # 01302.
2 STANDARD 1½" NUTS 8 THDS. PER INCH
01301-4
FIT TO PRESS
½" STEAM PIPE
FIT PRESS.
20 THDS R.H. U.S.S.
ASBESTOS
18 B.W.G. S. STEEL
COPPER TUBE # 18
WORKING FIT
01301-5
GROUND.
½" M. STEEL JACKET
01301-2
WORKING FIT
FIT TO PRESS.
1.898
TAPER 1/4 PER FT.
1.704
1½" LEAD - DOUBLE THREADS.
1.000
8 THDS PER FOOT
4.187
WORK TO MOULD CAP DISC-GAUGE.
POLISHED AND NICKELED
2.610
LET THREAD DIE OUT HERE
1.856
1.906
ONE WANTED M-STEEL.
3" FIT TO PRESS.
12 THDS PER INCH
ONE WANTED M. STEEL.
01301-1
FIT TO PRESS.
1.77
THIS PRINT IS FOR EXPERIMENTAL PURPOSES ONLY AND WHEN WORK IS COMPLETED UPON THIS PIECE ANY ALTERATIONS TO THESE DIMENSIONS SHOULD BE RECORDED ON THIS PRINT AND RETURNED TO THE DRAFTING DEPT. AT ONCE.
PRESS MOULD FOR CYLINDER RECORD. (CONDENSITE) (CORED)
EDISON PHONOGRAPH CO.
ORANGE N.J.
NOV. 17-10
DRAWN BY
CHECKED "
APP'D "
01301
[REDUCTION RATIO = 18:1]

983

WEST ORANGE LABORATORY RECORDS
OVERSIZE DRAWINGS

These three drawings are blueprints of the Edison laboratory and phonograph works at West Orange. The first blueprint, dated February 14, 1899, is a ground plan of the properties of the laboratory complex and the National Phonograph Co. Included is an index specifying the building number, name, and type of construction. The other two blueprints are maps of the real estate holdings of Thomas A. Edison, Inc., and the Edison Phonograph Works. The first map, dated May 31, 1911, was drawn from a tracing prepared by the Fidelity Trust Co. in March 1909. The other map is undated but is probably from 1911. Included on each is an index specifying the building number, the name of the grantor and grantee of the property, and the book and page where the transaction was recorded in the Essex County Records. The drawing from May 1911 was drafted by James W. Knoblock, a factory engineer for the Edison Storage Battery Co. in the 1910s. The other blueprints also may have been drawn by Knoblock.

984

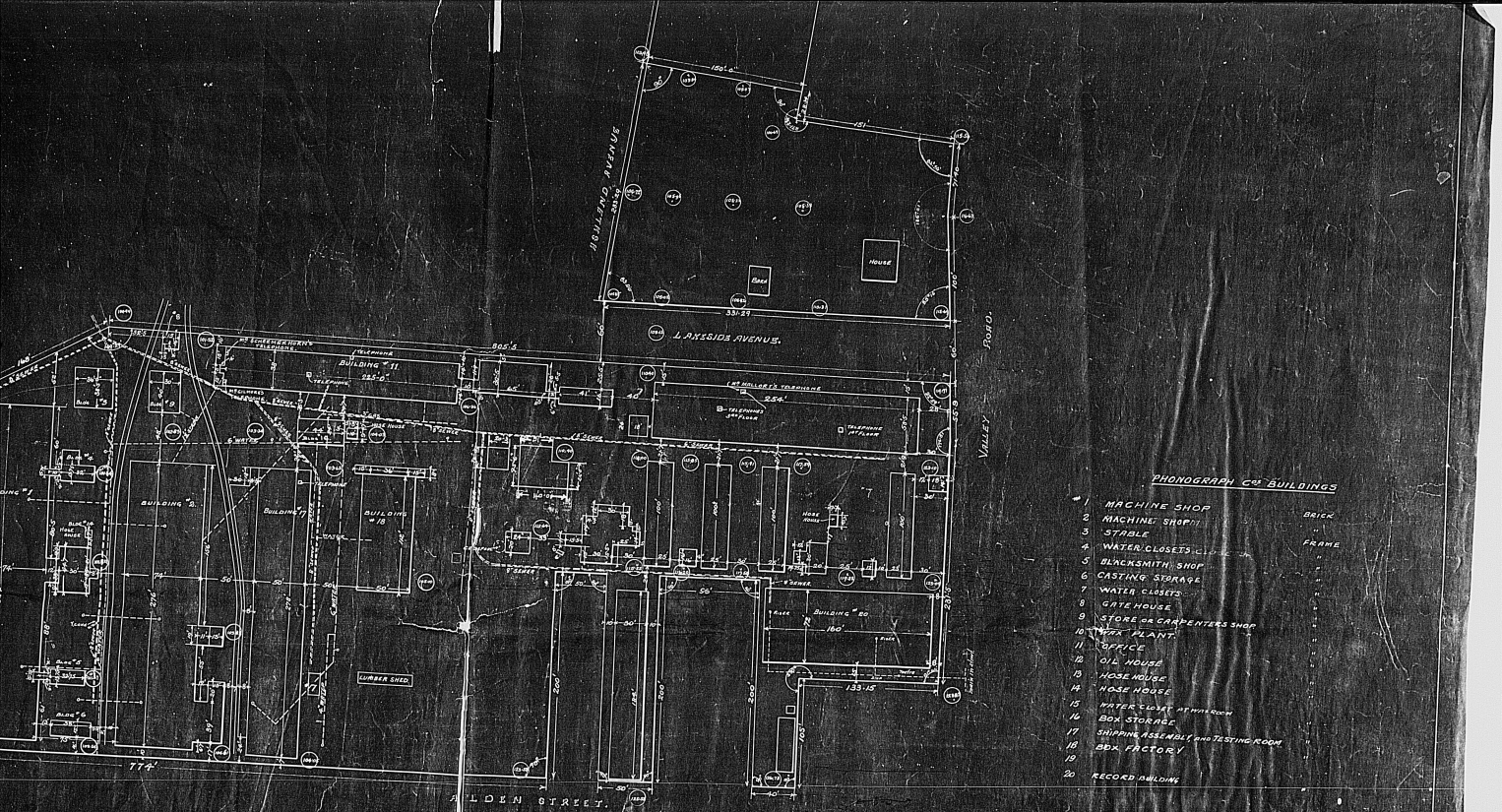


985

[FILMED IN SECTIONS]

1	2

[REDUCTION RATIO = 18:1]



GROUND PLAN
OF
PHONOGRAPH AND LABORATORY
PROPERTIES AND BUILDINGS.
ORANGE, N.J.

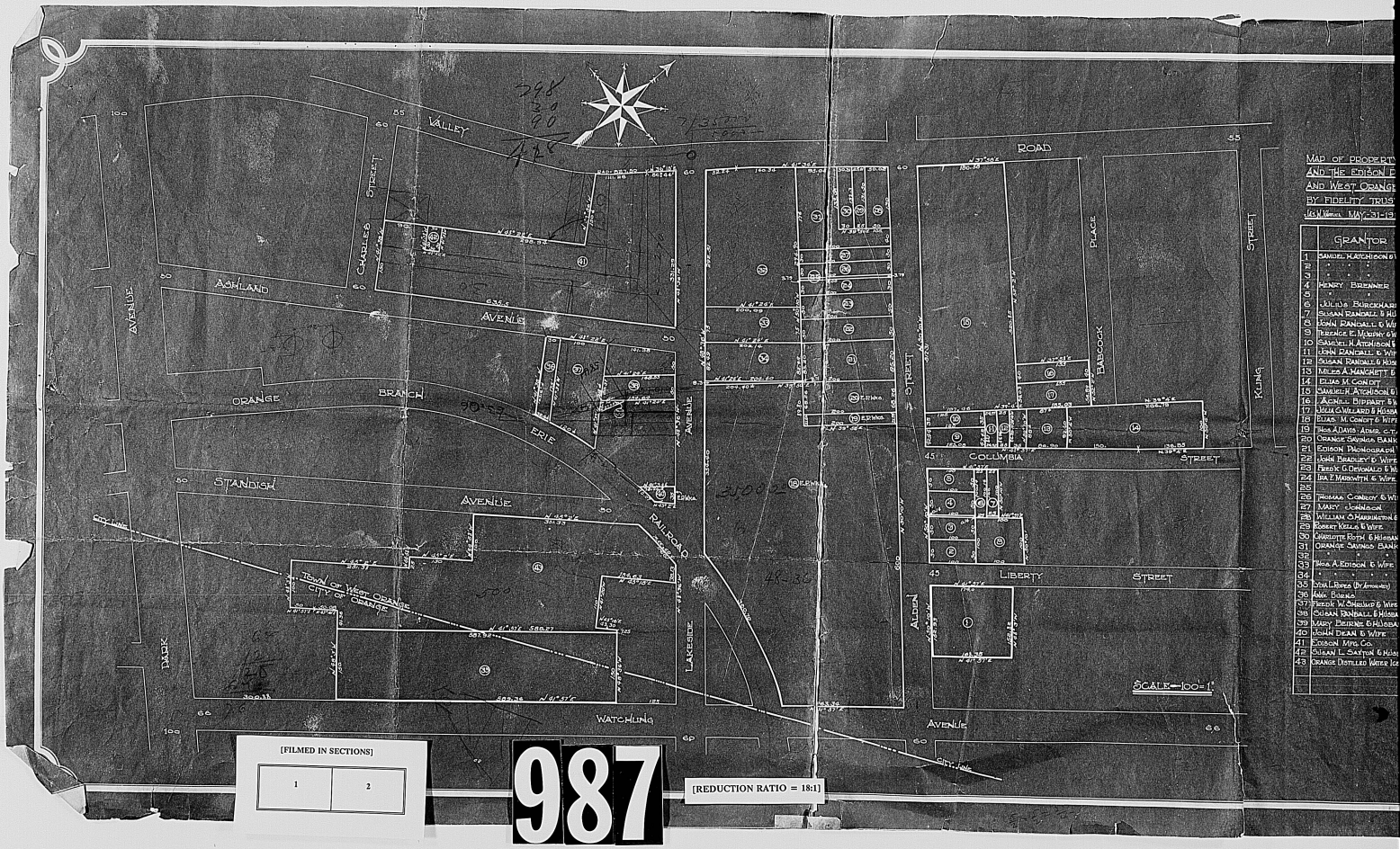
SCALE 50'=1"
FEB 16-98
JK

986

[FILMED IN SECTIONS]

1	2

[REDUCTION RATIO = 18:1]

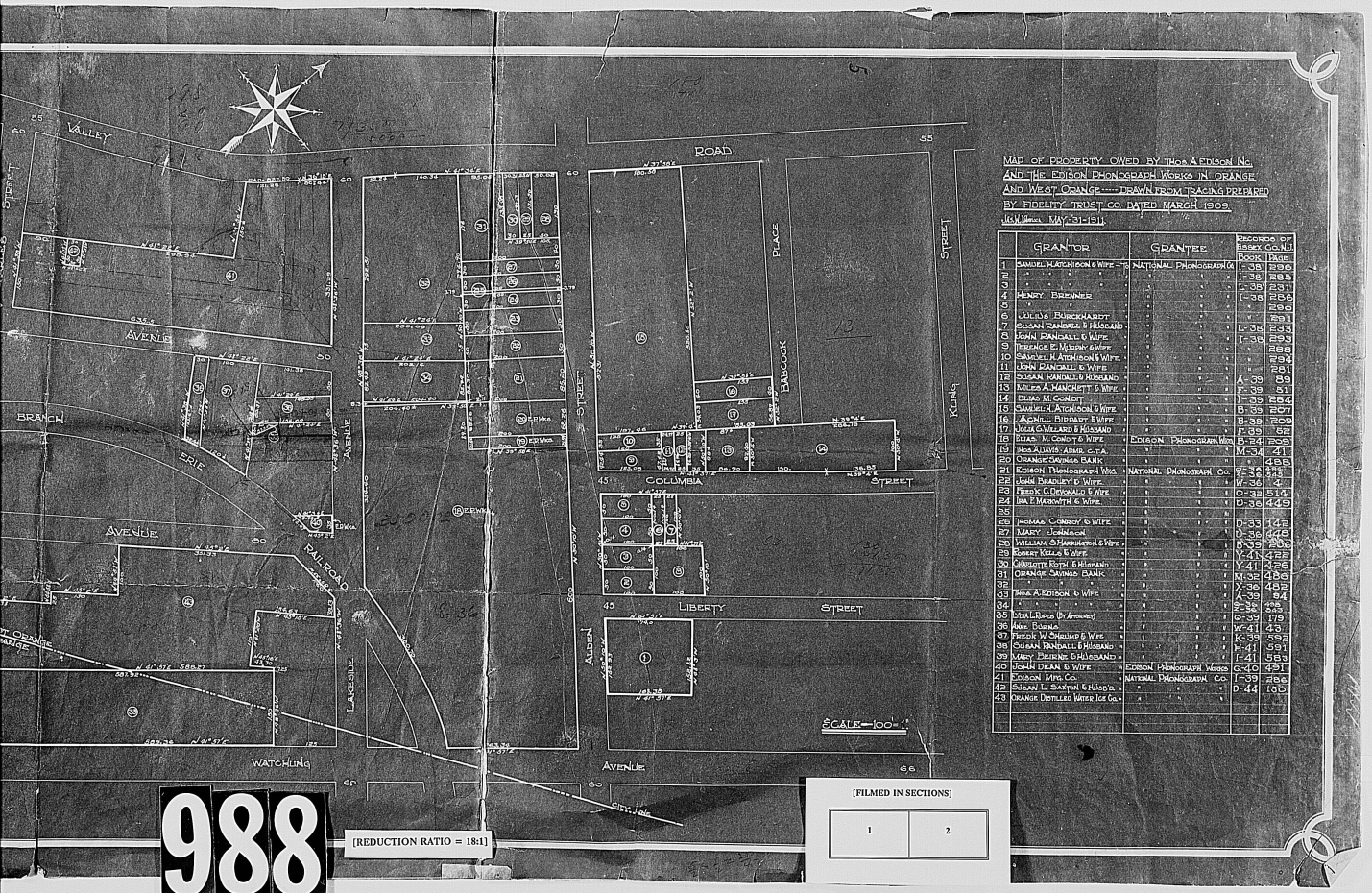


[FILMED IN SECTIONS]

1	2

987

[REDUCTION RATIO = 18:1]



MAP OF PROPERTY OWED BY THOS. A. EDISON INC. AND THE EDISON PHONOGRAPH WORKS IN ORANGE AND WEST ORANGE — DRAWN FROM TRACING PREPARED BY FIDELITY TRUST CO. DATED MARCH 1909.

W.S.V. MAY-31-1911.

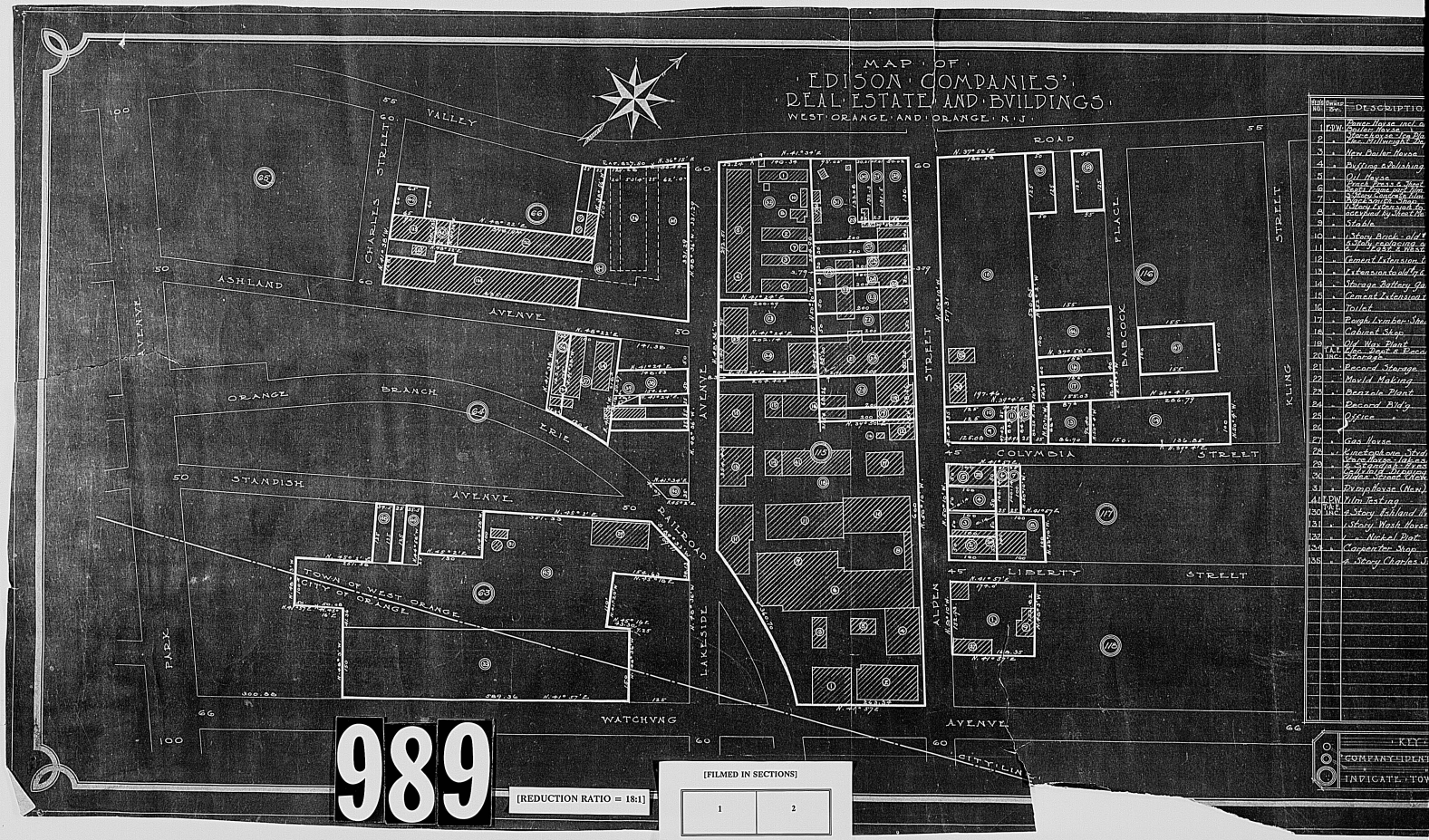
	GRANTOR	GRANTEE	RECORDS OF ESSEX CO. N.J. BOOK	PAGE
1	SAMUEL HATCHISON & WIFE	NATIONAL PHONOGRAPH CO.	L-38	236
2	" "	" "	L-38	285
3	" "	" "	L-38	231
4	HENRY BRUNNER	" "	L-38	286
5	" "	" "	"	295
6	WILHELM BURCKHARDT	" "	"	291
7	SUSAN RANDALL & HUSBAND	" "	L-38	233
8	JOHN RANDALL & WIFE	" "	L-38	293
9	TERRANCE E. MURPHY & WIFE	" "	"	288
10	SAMUEL H. ATCHISON & WIFE	" "	"	294
11	JOHN RANDALL & WIFE	" "	"	281
12	SUSAN RANDALL & HUSBAND	" "	A-39	89
13	MILES A. MANCHESTER & WIFE	" "	F-39	51
14	ELIAS M. CONDIT	" "	F-39	284
15	SAMUEL H. ATCHISON & WIFE	" "	B-39	207
16	ARNOLD BIPPART & WIFE	" "	B-39	209
17	JOHN GILLARD & HUSBAND	" "	B-39	62
18	ELIAS M. CONDIT & WIFE	EDISON PHONOGRAPH WKS.	B-34	229
19	THOS. A. DAVIS ADMR. C.T.A.	" "	M-34	41
20	ORANGE SAVINGS BANK	" "	"	488
21	EDISON PHONOGRAPH WKS.	NATIONAL PHONOGRAPH CO.	W-36	343
22	JOHN BRADLEY & WIFE	" "	W-36	4
23	FREDK. G. DEVONALD & WIFE	" "	O-38	514
24	IRA E. MARSWITH & WIFE	" "	O-38	449
25	" "	" "	"	"
26	THOMAS CONDLEY & WIFE	" "	O-33	142
27	MARY JOHNSON	" "	O-36	445
28	WILLIAM O. HARRINGTON & WIFE	" "	B-39	206
29	ROBERT KELLY & WIFE	" "	Y-41	422
30	CHARLOTTE ROTH & HUSBAND	" "	Y-41	456
31	ORANGE SAVINGS BANK	" "	X-38	486
32	" "	" "	X-36	482
33	THOS. A. EDISON & WIFE	" "	A-39	84
34	" "	" "	Z-38	543
35	OTTO LIEBER (W. ARNOLD)	" "	Z-39	179
36	ANNE BURNS	" "	W-41	43
37	FREDK. W. SPERLING & WIFE	" "	K-39	592
38	SUSAN TRENDALL & HUSBAND	" "	M-41	591
39	MARY BRENNE & HUSBAND	" "	P-41	583
40	JOHN DEAN & WIFE	EDISON PHONOGRAPH WORKS	G-40	491
41	EDISON MFG. CO.	NATIONAL PHONOGRAPH CO.	I-39	286
42	SUSAN L. SAYTON & HUSB'D.	" "	O-44	155
43	ORANGE DISTILLED WATER ICE CO.	" "		

988

[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1	2

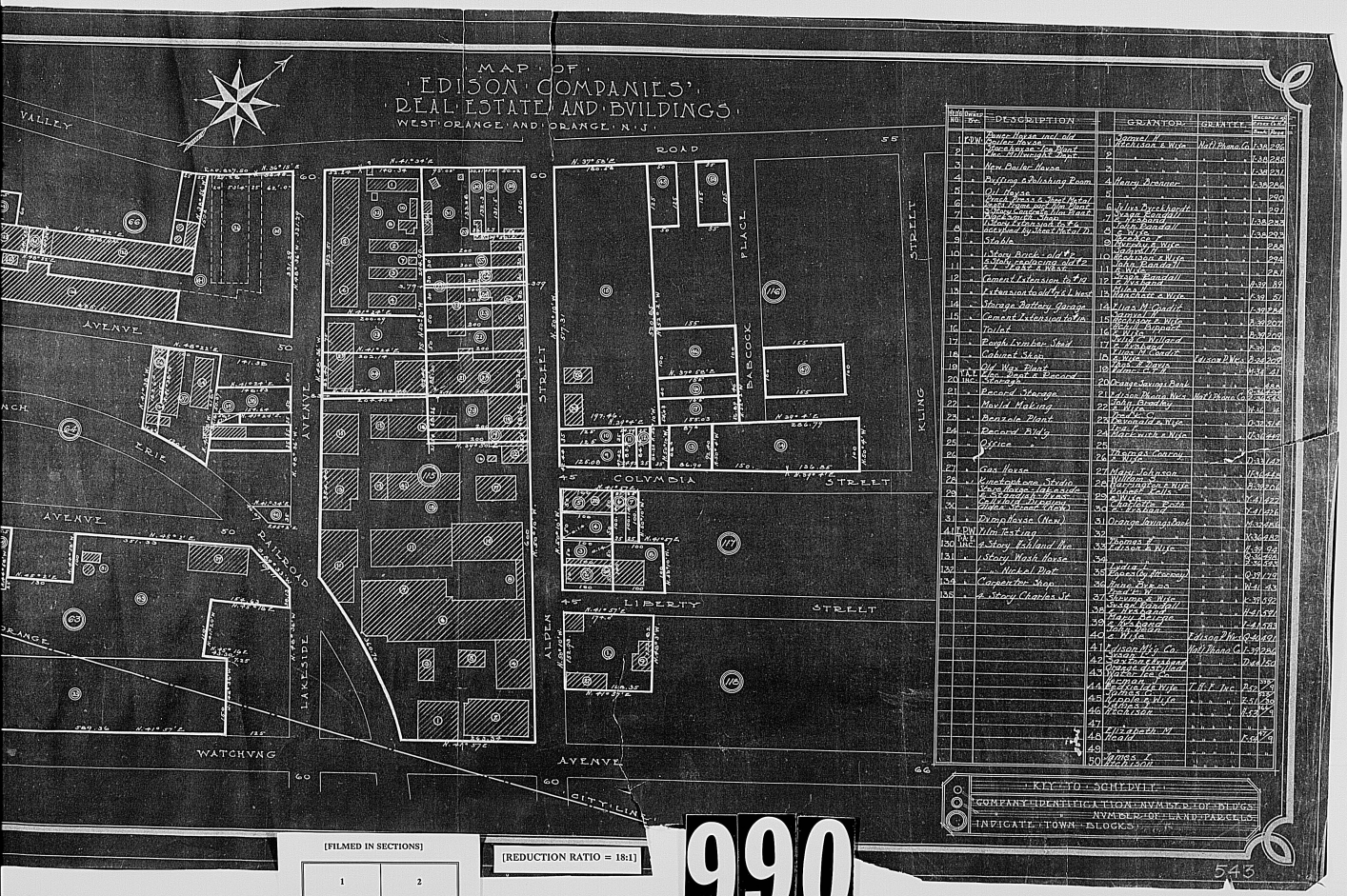


989

[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1	2

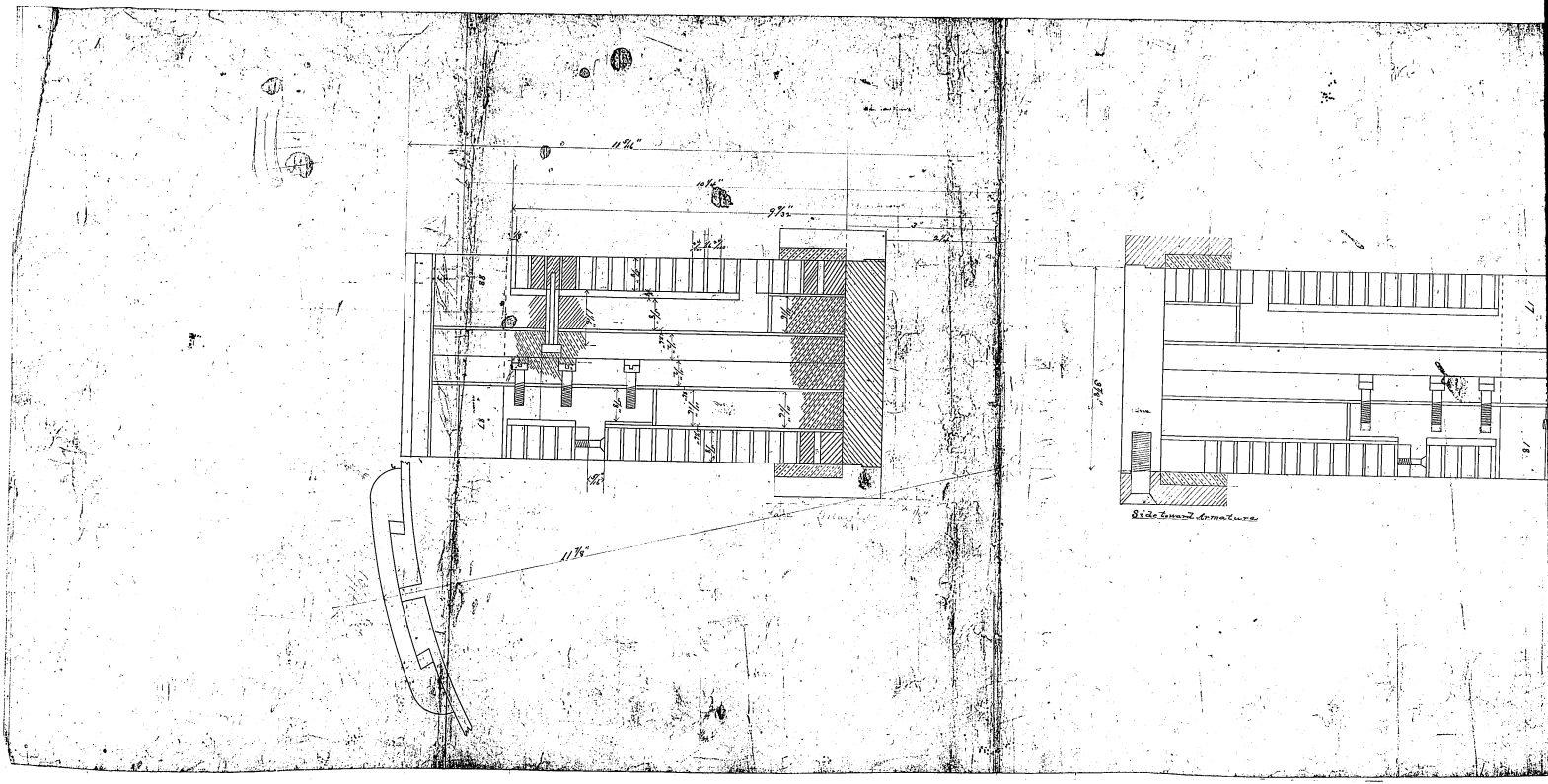


Bldg. No.	Block & Lot	DESCRIPTION	GRANTOR	GRANTEE	Amount	Date
1	FDW	Power House incl. old Boiler House	Hayward, F.			
2		Turbine Room at Ice Plant	Electric & Wire	Nat'l Phono Co	1,38	2/26
3		Ice Plant & Refrigerating Plant				
4		New Boiler House			1,38	2/26
5		Buffing & Polishing Room	Anthony Brenner		1,38	2/26
6		Oil House				2/27
7		Steel Frame & Wood Metal Shop Room and Wood Shop	Klaus Puschhardt			2/27
8		Machine Shop	Frank Randall		1,38	2/27
9		Heavy Extension to F & G	Elias M. Randall			
10		Accessory System Metal D.	Edison & Wife		1,38	2/27
11		Stable	Frank Z.			2/28
12		1 Story Brick, old #	Turchin & Wife			2/28
13		1 Story, replacing attic	Edison & Wife			2/28
14		Cement Extension to F & G West	Frank Randall			2/31
15		Cement Extension to F & G West	Frank Randall		1,39	5/29
16		Storage Battery Garage	Elias M.		1,39	5/29
17		Cement Extension to F & G	Machine & Wife		1,39	5/29
18		Toilet	Edison & Wife		1,39	2/27
19		Rough Lumber Shed	Frank Randall		1,39	2/29
20		Cement Shop	Elias M.		1,39	2/29
21		Oil Wax Plant	Turchin & Wife	Edison Elec. Wks	2,38	2/29
22		Wax Shop & Record Storage	Edison & Wife		1,38	2/31
23		Record Storage	Storage Savage Bank			2/32
24		Mold Making	Edison Phono Wks	Nat'l Phono Co	1,38	2/32
25		Benzole Plant	John Bentley		1,38	2/32
26		Record Bldg.	Edison & Wife		1,38	2/32
27		Office	Parson & Wife		1,38	2/32
28			Turchin & Wife		1,38	2/32
29		Gas House	Frank Conroy		2,38	2/32
30		Investigation Studio	Napoleon Johnson		1,38	2/32
31		Wax Press Machine	Warrington & Wife		1,38	2/32
32		Wax Press Machine	Edward Collins		1,38	2/32
33		Wax Press Machine	Frank Wise		1,38	2/32
34		Wax Press Machine	Frank Wise		1,38	2/32
35		Wax Press Machine	Frank Wise		1,38	2/32
36		Wax Press Machine	Frank Wise		1,38	2/32
37		Wax Press Machine	Frank Wise		1,38	2/32
38		Wax Press Machine	Frank Wise		1,38	2/32
39		Wax Press Machine	Frank Wise		1,38	2/32
40		Wax Press Machine	Frank Wise		1,38	2/32
41	FDW	Wax Testing	Frank Wise		1,38	2/32
130	INC.	2 Story Enlarged Bldg.	Edison & Wife		2,38	2/32
131		1 Story Wash House	Edison & Wife		2,38	2/32
132		Nickel Plat	Edison & Wife		2,38	2/32
133		Carpenter Shop	Edison & Wife		2,38	2/32
134		2 Story Charles St.	Edison & Wife		2,38	2/32
			Edison & Wife		2,38	2/32
			Edison & Wife		2,38	2/32

SUPPLEMENT TO PARTS I, II, AND III
OVERSIZE NOTES AND DRAWINGS

These eleven oversize drawings are all by unidentified authors. Eight of the items are from September and October 1880 and concern generators for electric lighting. A drawing made sometime during the period 1882-1884 involves a field generator for central stations. The two other drawings were probably made in 1887 or 1888. One pertains to a pyromagnetic device. The other relates to a pyromagnetic generator and contains manufacturing instructions by Edison.

991

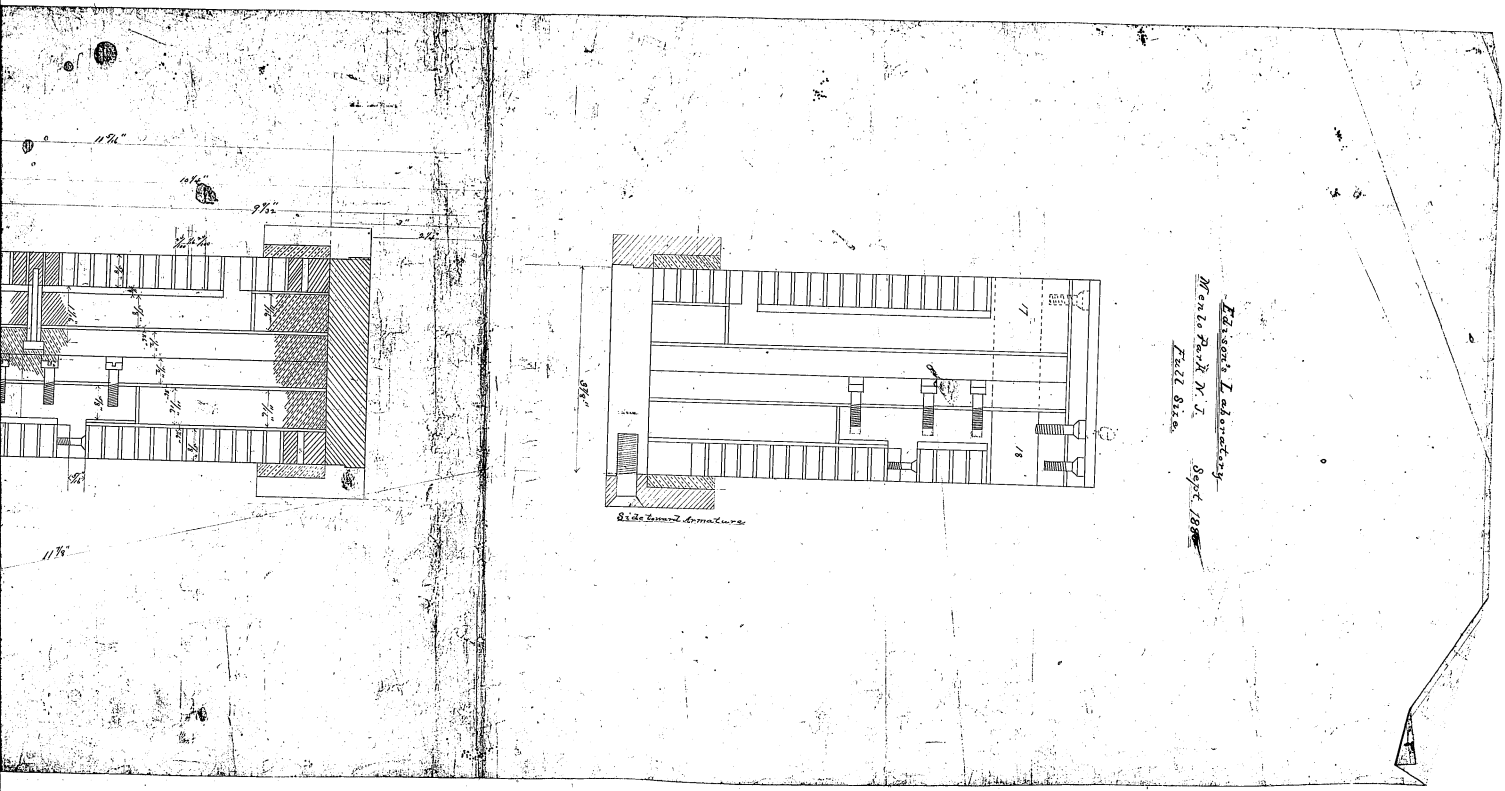


992

[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1	2



993

[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

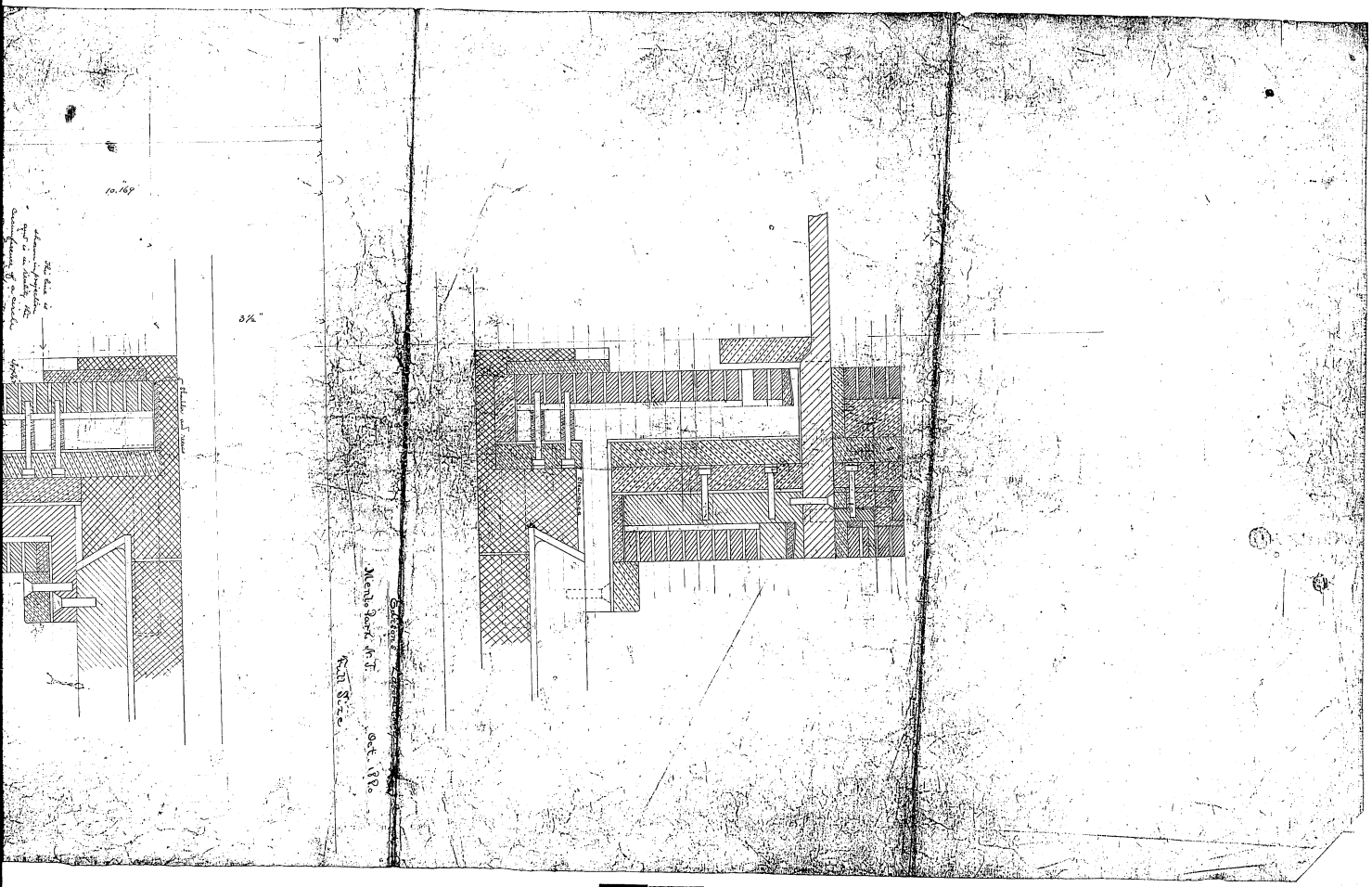
1	2

994

[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1	2



995

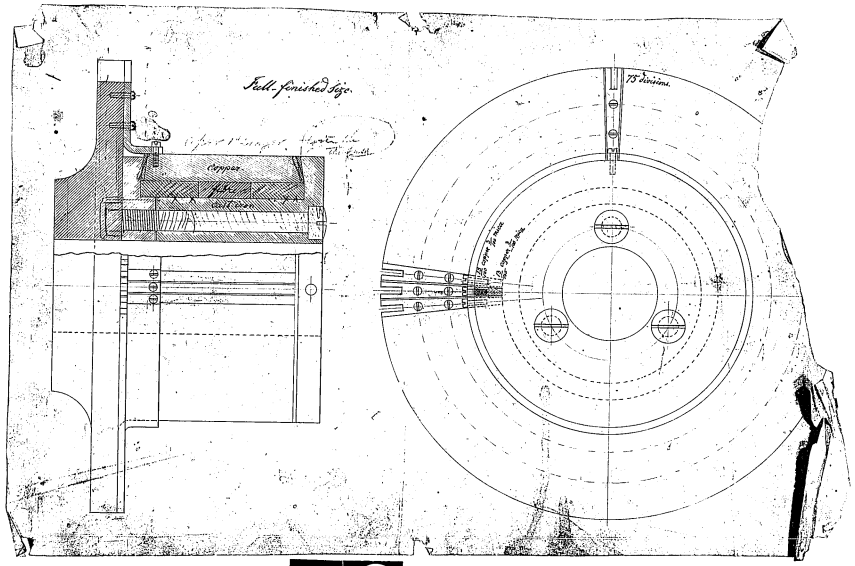
[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1	2

996

[REDUCTION RATIO = 18:1]



997

[REDUCTION RATIO = 18:1]

[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1

2

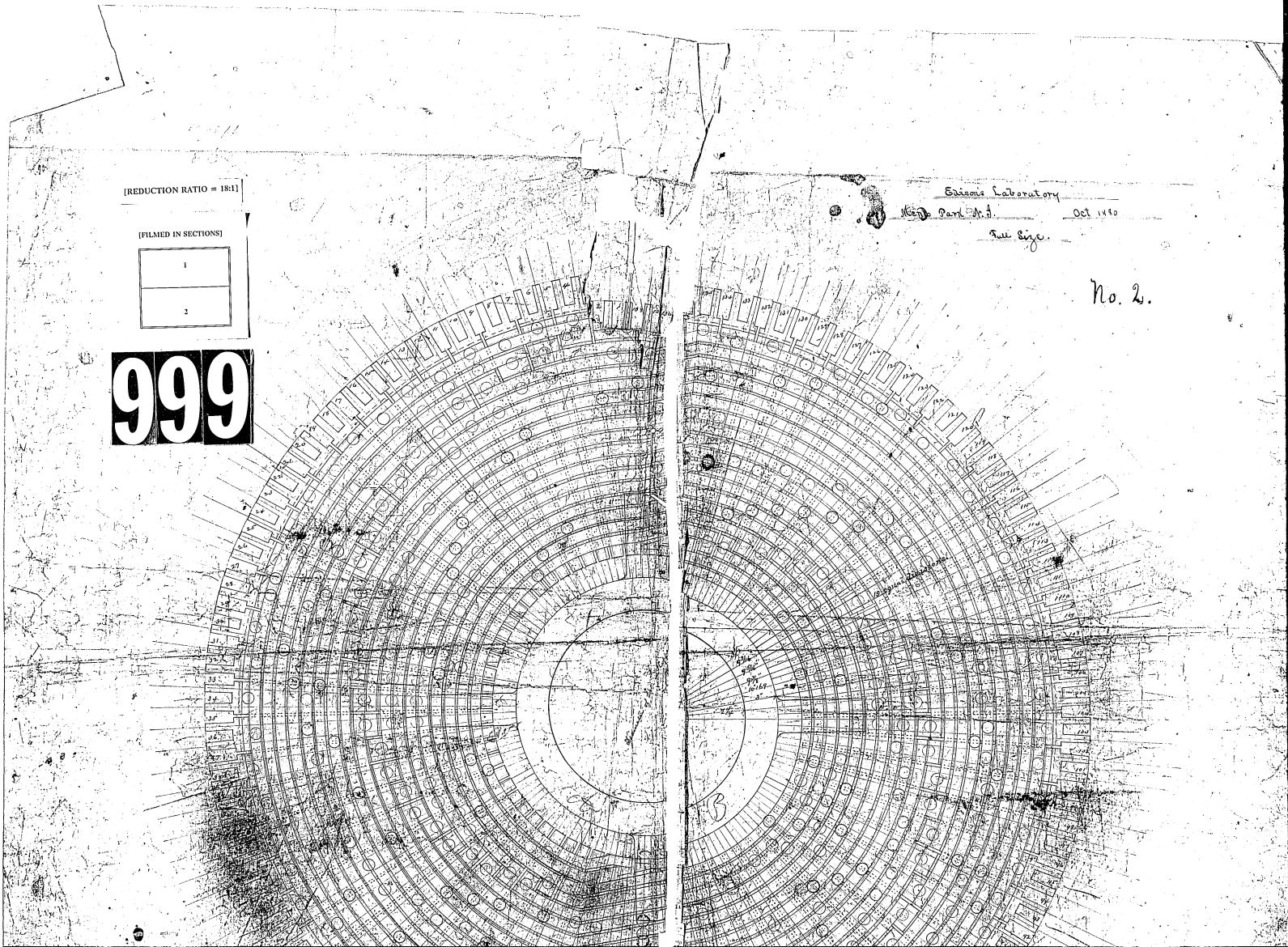
999

Edisons Laboratory

Key Park N.J. Oct 1880

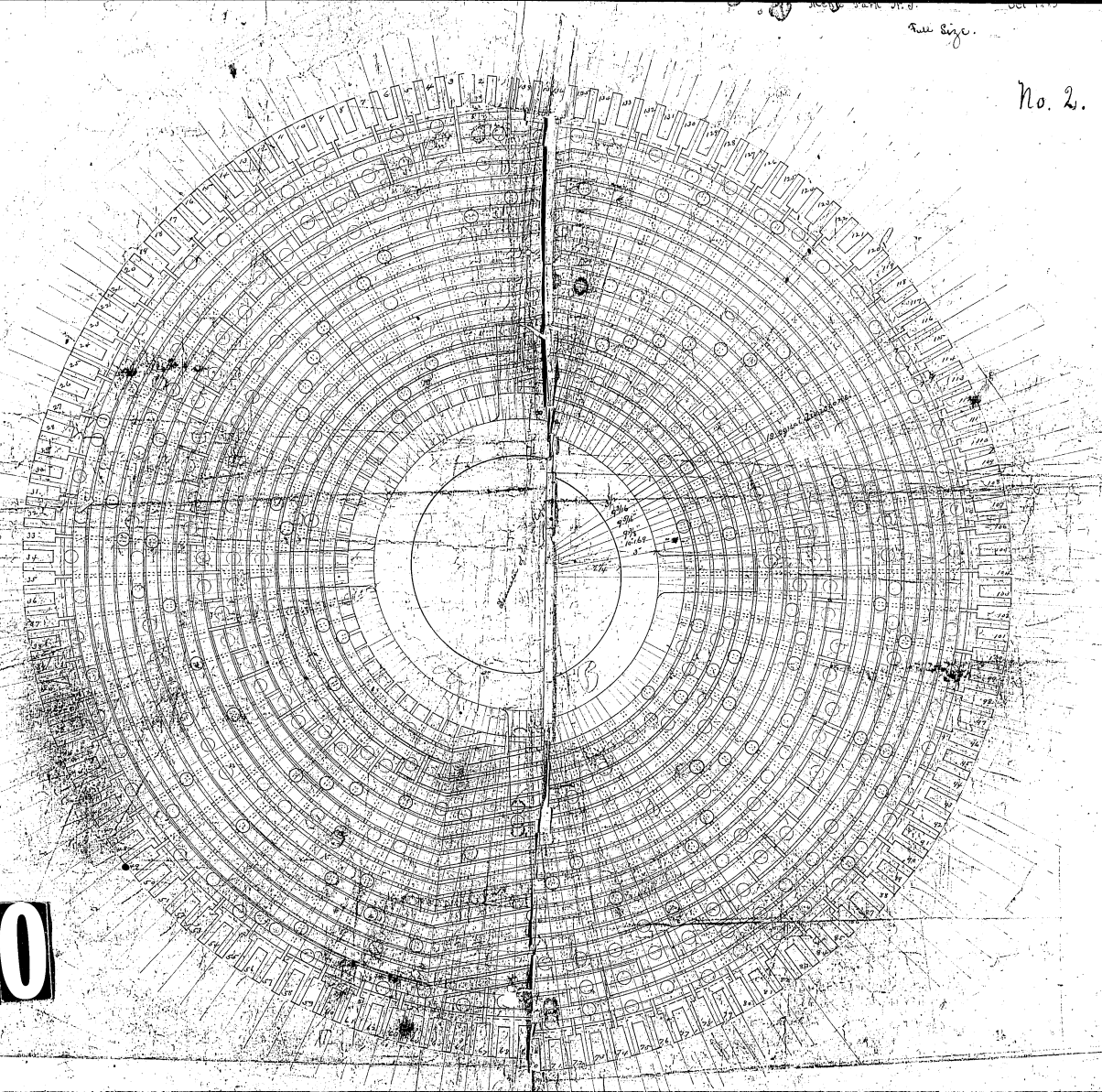
Full Size.

No. 2.



Full Size.

No. 2.



[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1

2

1000

Edison's Laboratory.

Menlo Park, N. J. Oct. 1880

Full Size.

[FILMED IN SECTIONS]

1

2

[REDUCTION RATIO = 18:1]

1001

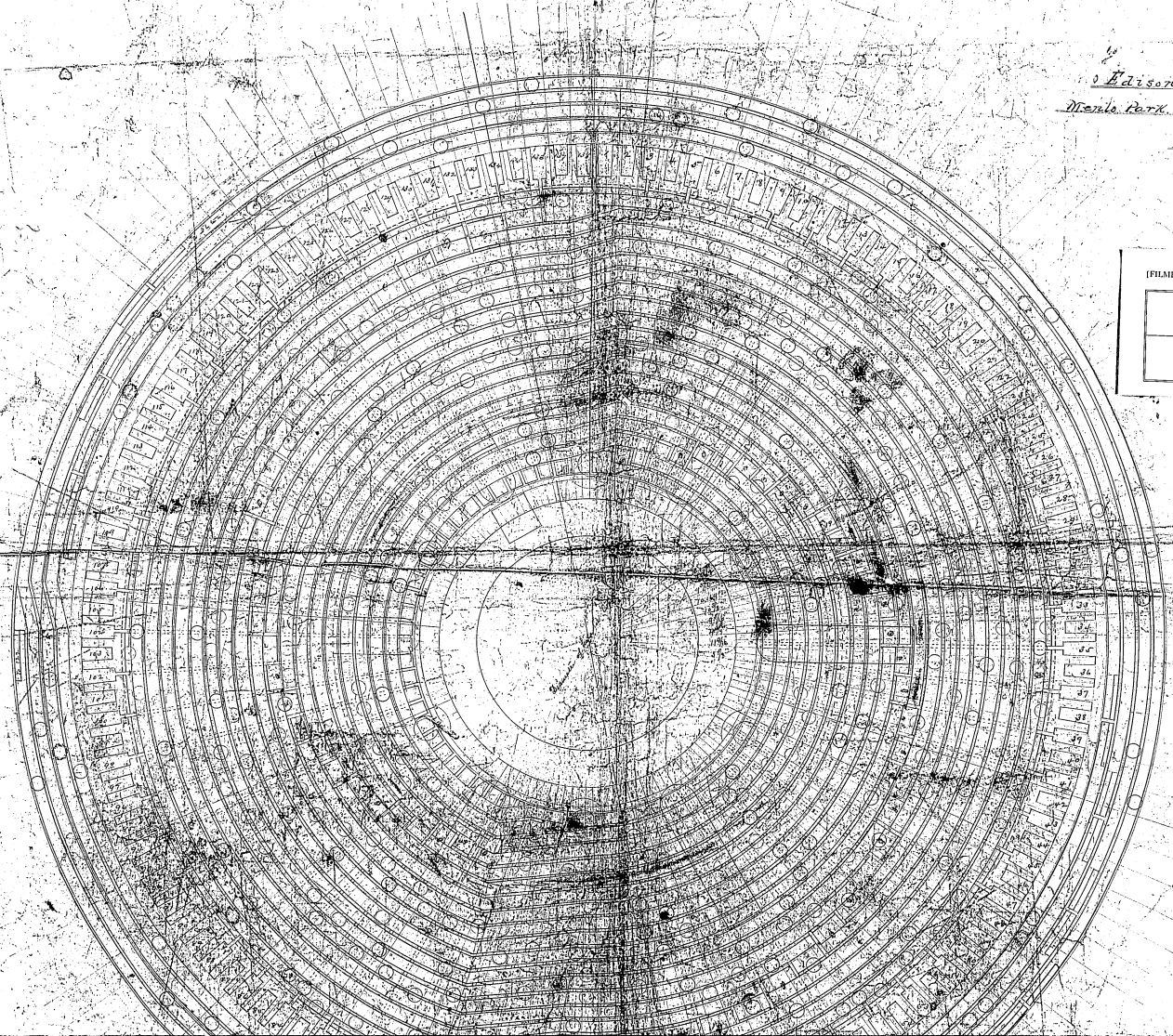


Table of Connections

Strip	Connection	Block
147	47	1
145	49	2
143	51	3
141	53	4
139	55	5
137	57	6
135	59	7
133	61	8
131	63	9
129	65	10
127	67	11
125	69	12
123	71	13
121	73	14
119	75	15
117	77	16
115	79	17
113	81	18
111	83	19
109	85	20
107	87	21
105	89	22
103	91	23
101	93	24
99	95	25
97	97	26
95	99	27
93	101	28
91	103	29
89	105	30
87	107	31
85	109	32
83	111	33
81	113	34
79	115	35
77	117	36

Full Size.

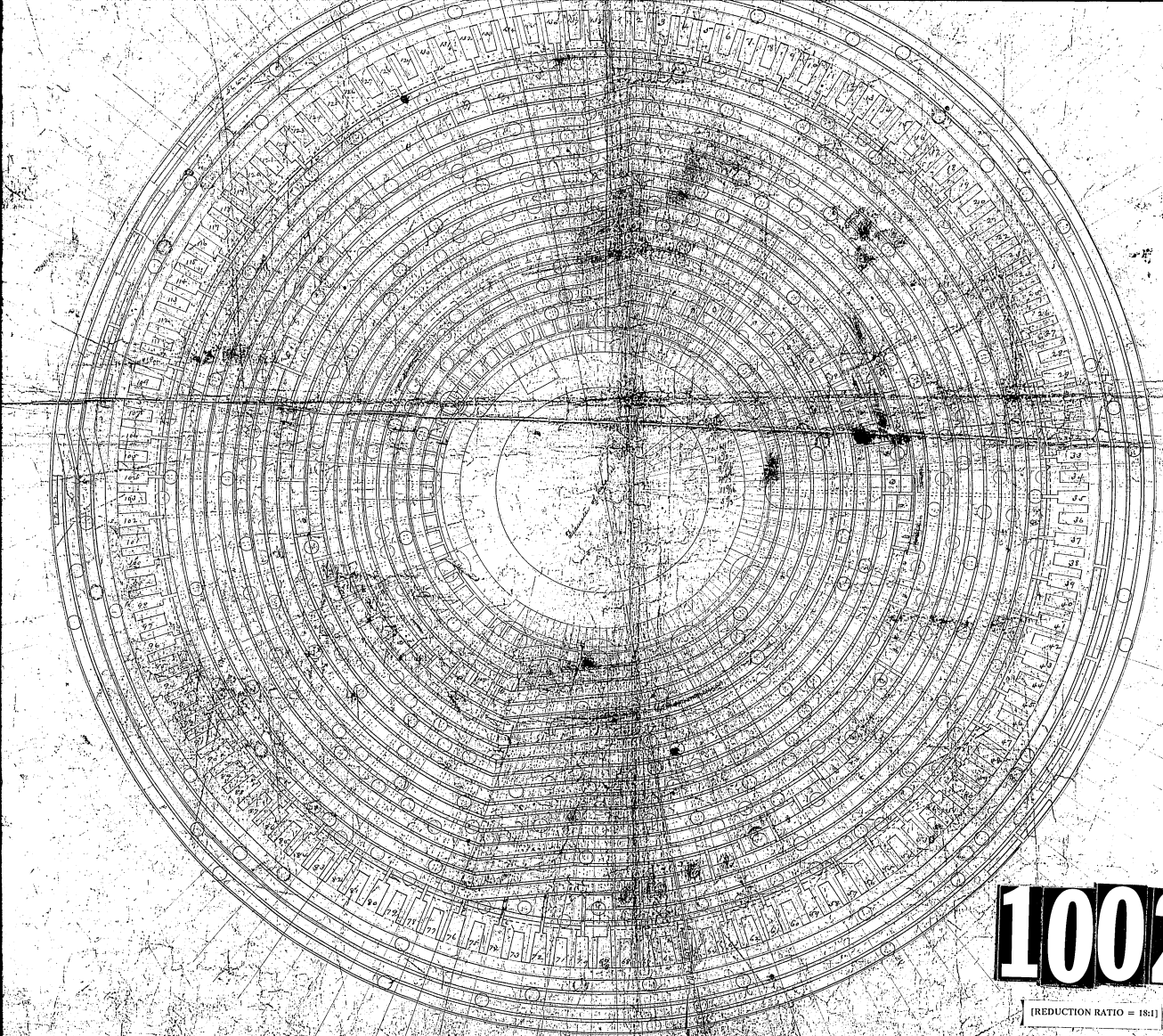


Table of Contents

127	69	77	
125	68	76	
123	67	75	
121	66	74	
119	65	73	
117	64	72	
115	63	71	
113	62	70	
111	61	69	
109	60	68	
107	59	67	
105	58	66	
103	57	65	
101	56	64	
99	55	63	
97	54	62	
95	53	61	
93	52	60	
91	51	59	
89	50	58	
87	49	57	
85	48	56	
83	47	55	
81	46	54	
79	45	53	
77	44	52	
75	43	51	
73	42	50	
71	41	49	
69	40	48	
67	39	47	
65	38	46	
63	37	45	
61	36	44	
59	35	43	
57	34	42	
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49	30	38	
47	29	37	
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41	26	34	
39	25	33	
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33	22	30	
31	21	29	
29	20	28	
27	19	27	
25	18	26	
23	17	25	
21	16	24	
19	15	23	
17	14	22	
15	13	21	
13	12	20	
11	11	19	
9	10	18	
7	9	17	
5	8	16	
3	7	15	
1	6	14	

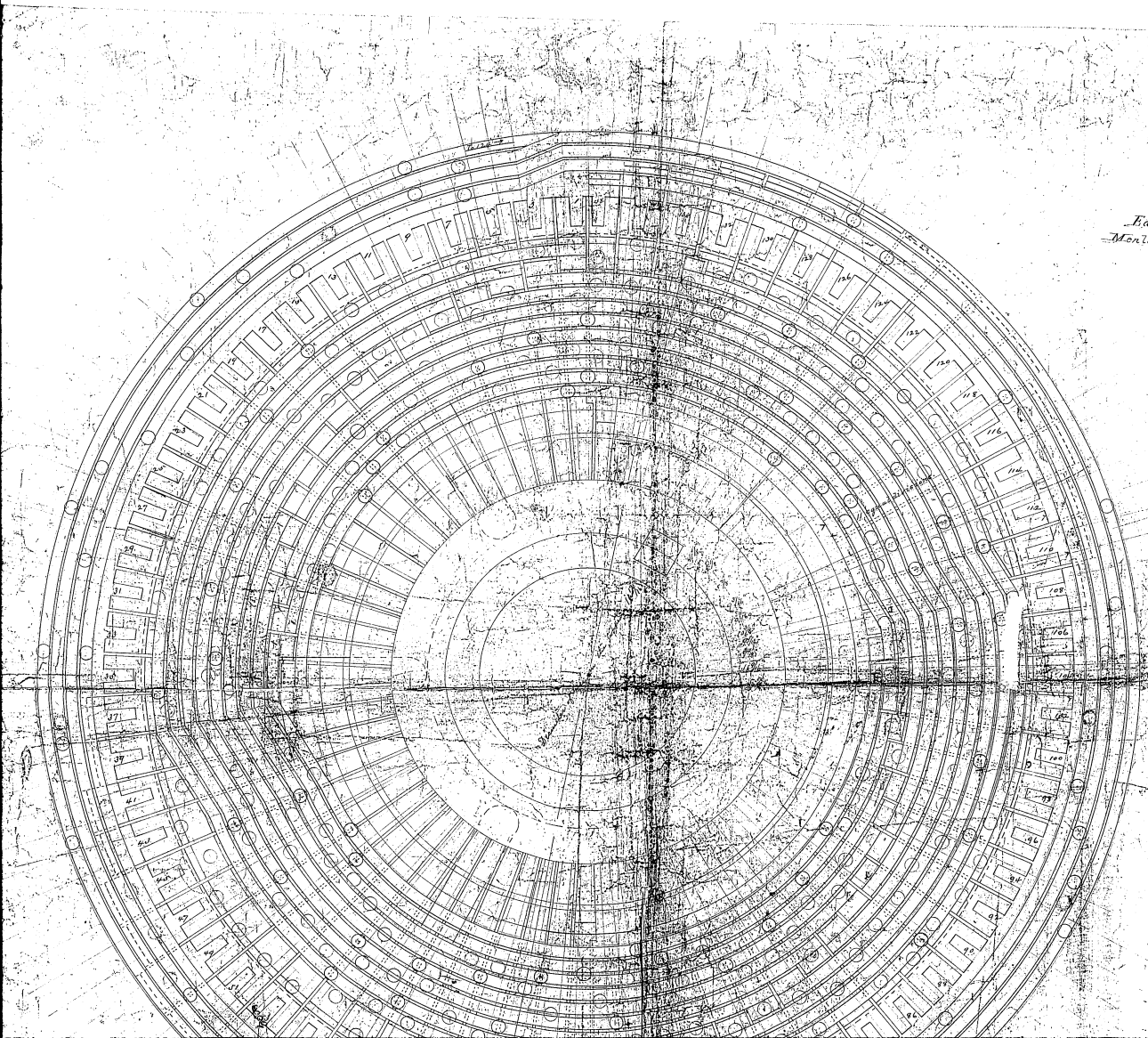
1002

[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1

2



Edison's Laboratory.
Menlo Park N.J.
Oct 1880.
Full Size.

[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1

2

1003

Table of Connections

Strand 2	74	65	137
	73	64	137
	72	63	135
	71	62	133
	70	61	131
	69	60	129
	68	59	127
	67	58	125
	66	57	123
	65	56	121
	64	55	119
	63	54	117
	62	53	115
	61	52	113
	60	51	111
	59	50	109
	58	49	107
	57	48	105
	56	47	103
	55	46	101
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	53	44	97
	52	43	95
	51	42	93
	50	41	91
	49	40	89
	48	39	87
	47	38	85
	46	37	83
	45	36	81
	44	35	79
	43	34	77
	42	33	75
	41	32	73
	40	31	71
	39	30	69
	38	29	67
	37	28	65
	36	27	63
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	34	25	59
	33	24	57
	32	23	55
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	30	21	51
	29	20	49
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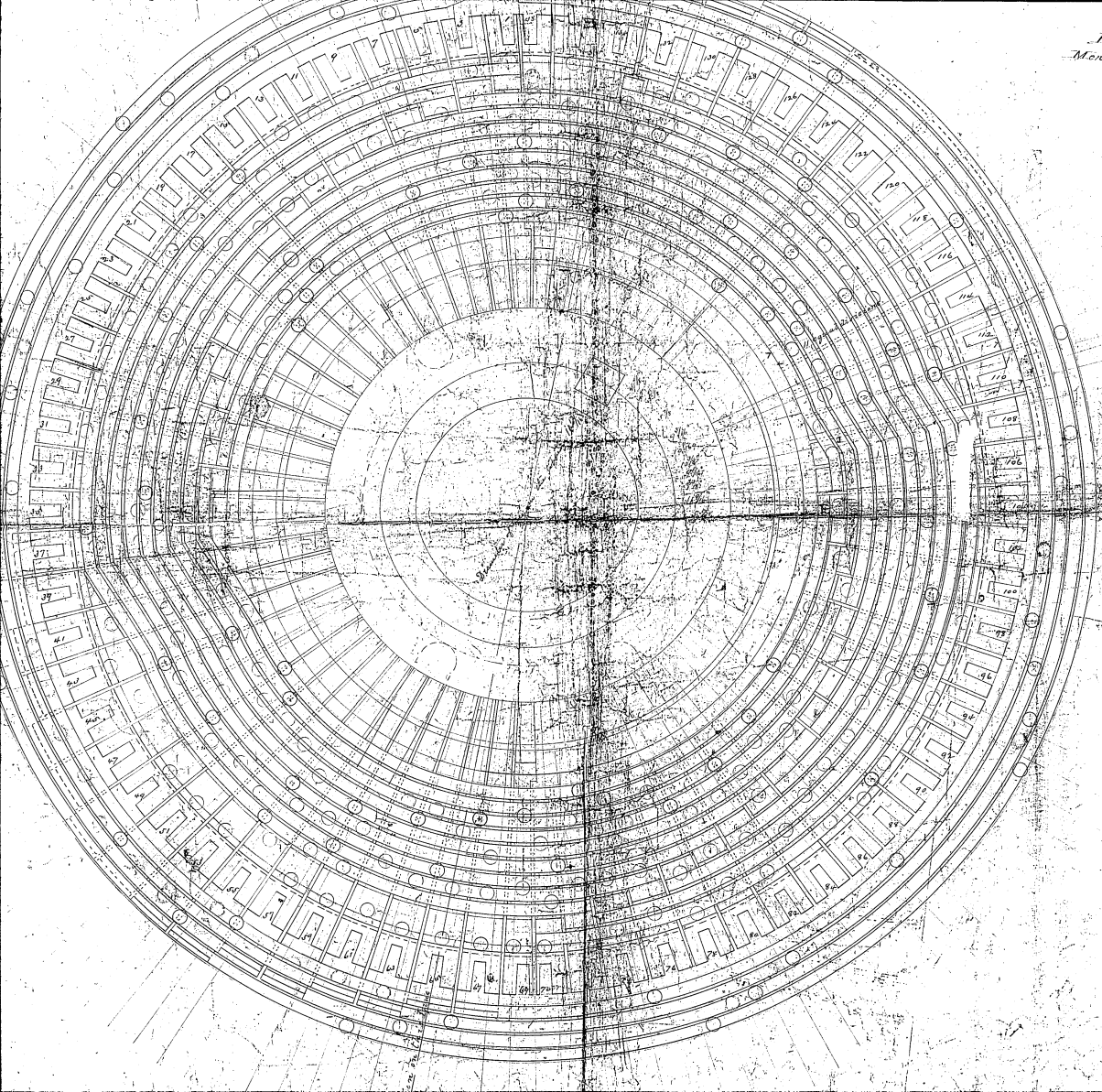
	27	18	45
	26	17	43
	25	16	41
	24	15	39
	23	14	37
	22	13	35
	21	12	33
	20	11	31
	19	10	29
	18	9	27
	17	8	25
	16	7	23
	15	6	21
	14	5	19
	13	4	17
	12	3	15
	11	2	13
	10	1	11
	9		
	8		
	7		
	6		
	5		
	4		
	3		
	2		
	1		

Edison's Laboratory
Menlo Park, N.J.
Oct 1880.
Full Size.



[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1

2

1004

Table of Connections

Strand		
70	40	137
69	39	1
67	34	140
65	33	141
63	32	142
61	31	132
59	30	130
57	29	128
55	28	126
53	27	124
51	26	122
49	25	120
47	24	118
45	23	116
43	22	114
41	21	112
39	20	110
37	19	108
35	18	106
33	17	104
31	16	102
29	15	100
27	14	98
25	13	96
23	12	94
21	11	92
19	10	90
17	9	88
15	8	86
13	7	84
11	6	82
9	5	80
7	4	78
5	3	76
3	2	74
1	1	72

[FILMED IN SECTIONS]

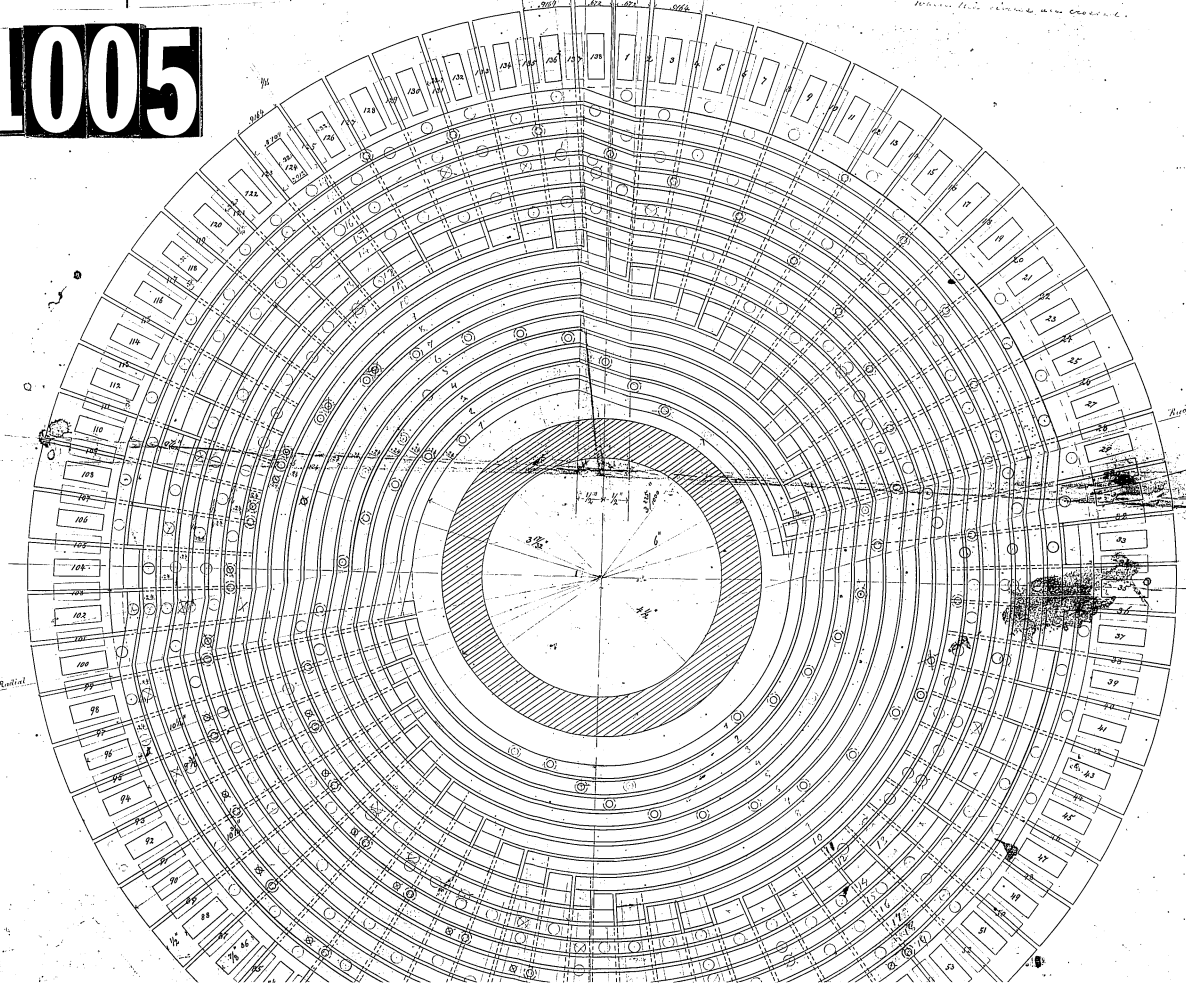
1
2

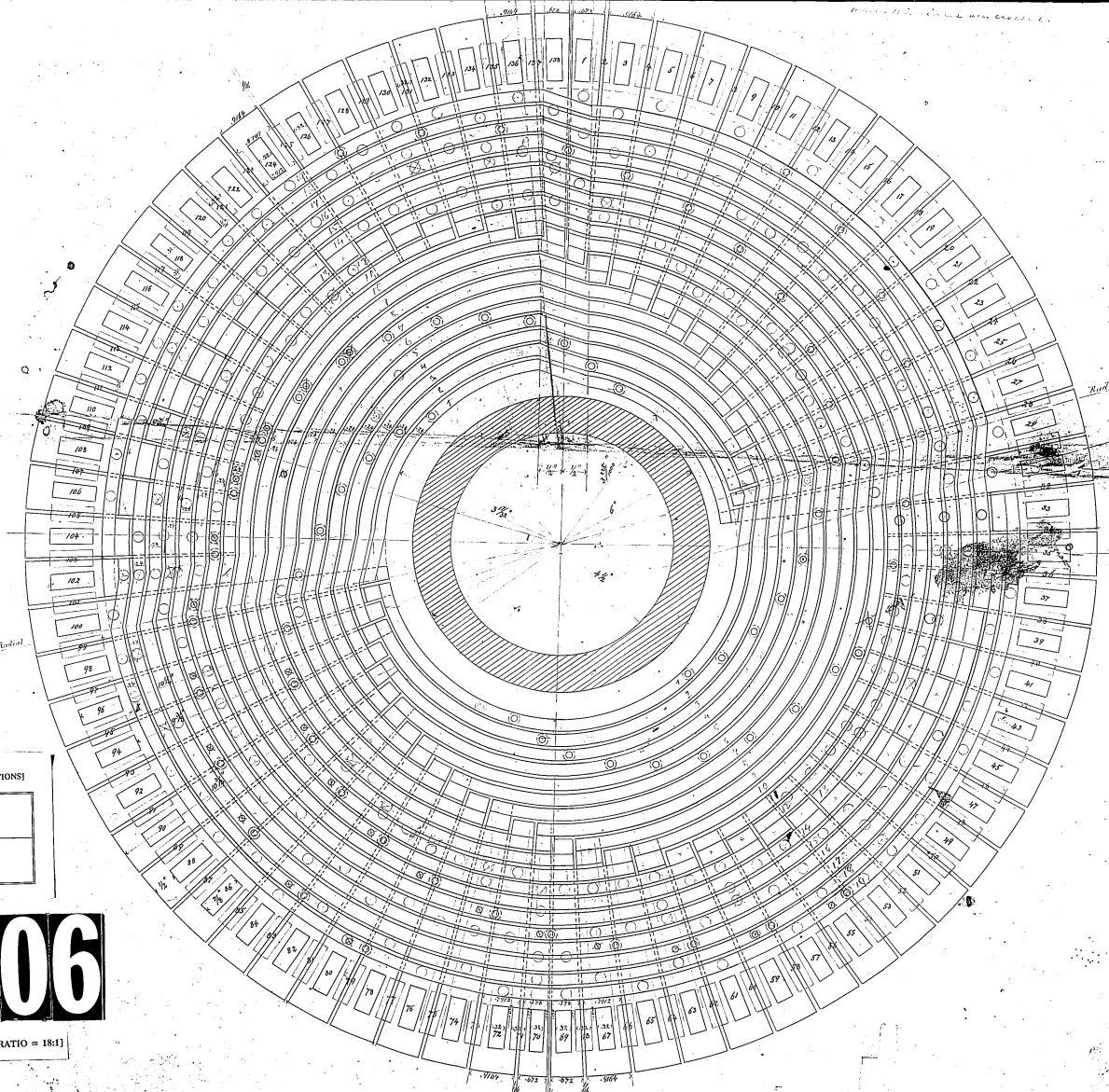
[REDUCTION RATIO = 18:1]

1005

Full Size.

Remark:-
Pencil marks to be omitted
when this chart is used.





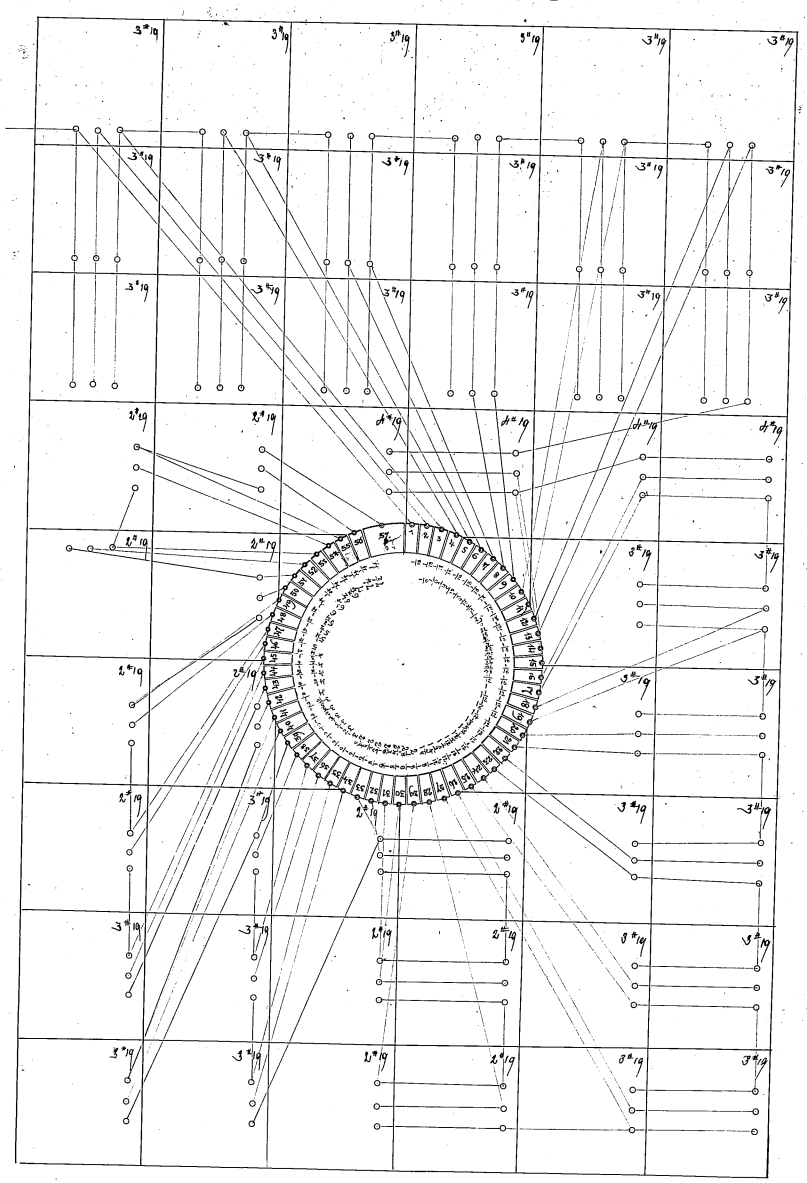
[FILMED IN SECTIONS]

1
2

1006

[REDUCTION RATIO = 18:1]

Diagram of
Connection
Field Regulator
Central Station



1007
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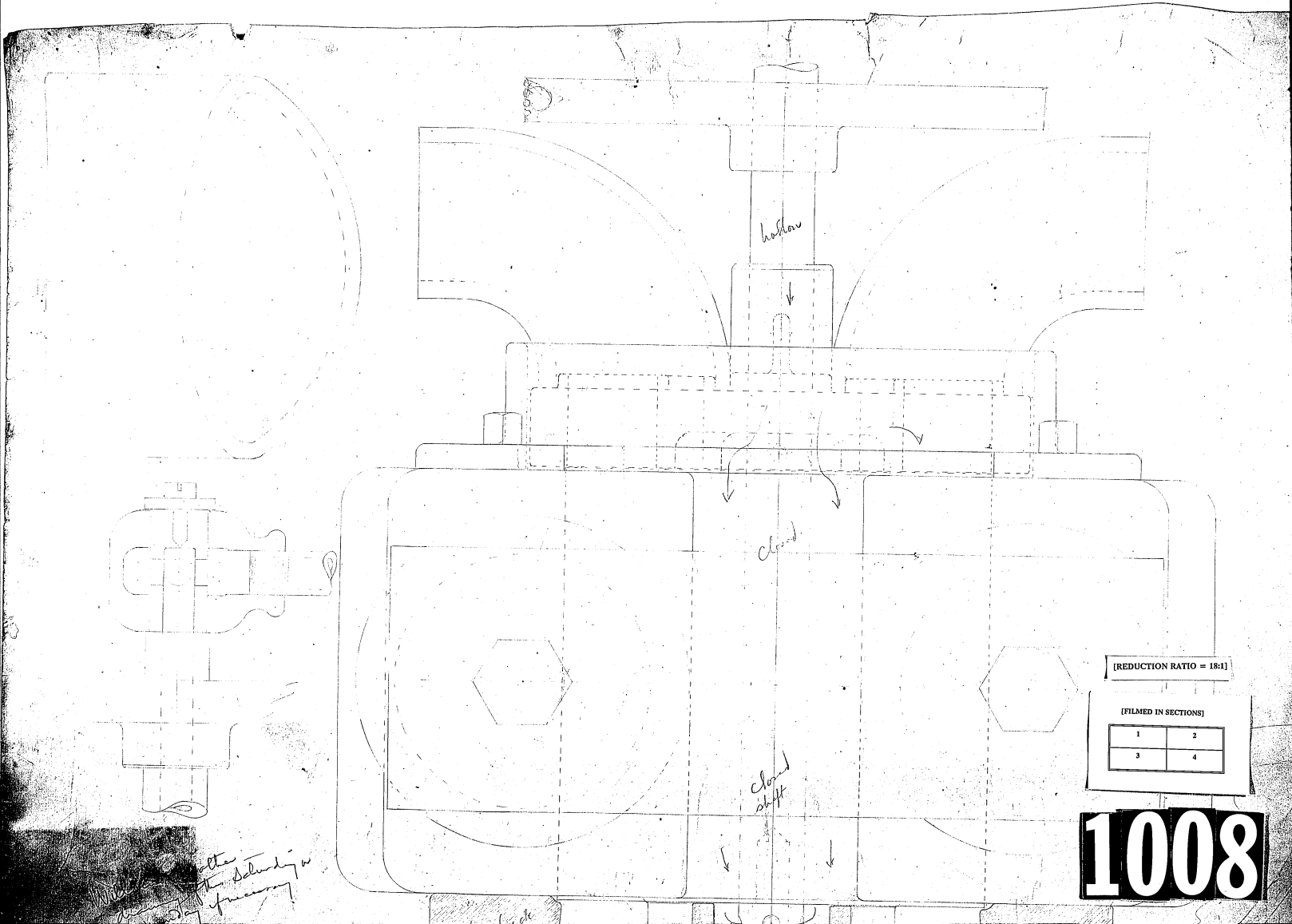
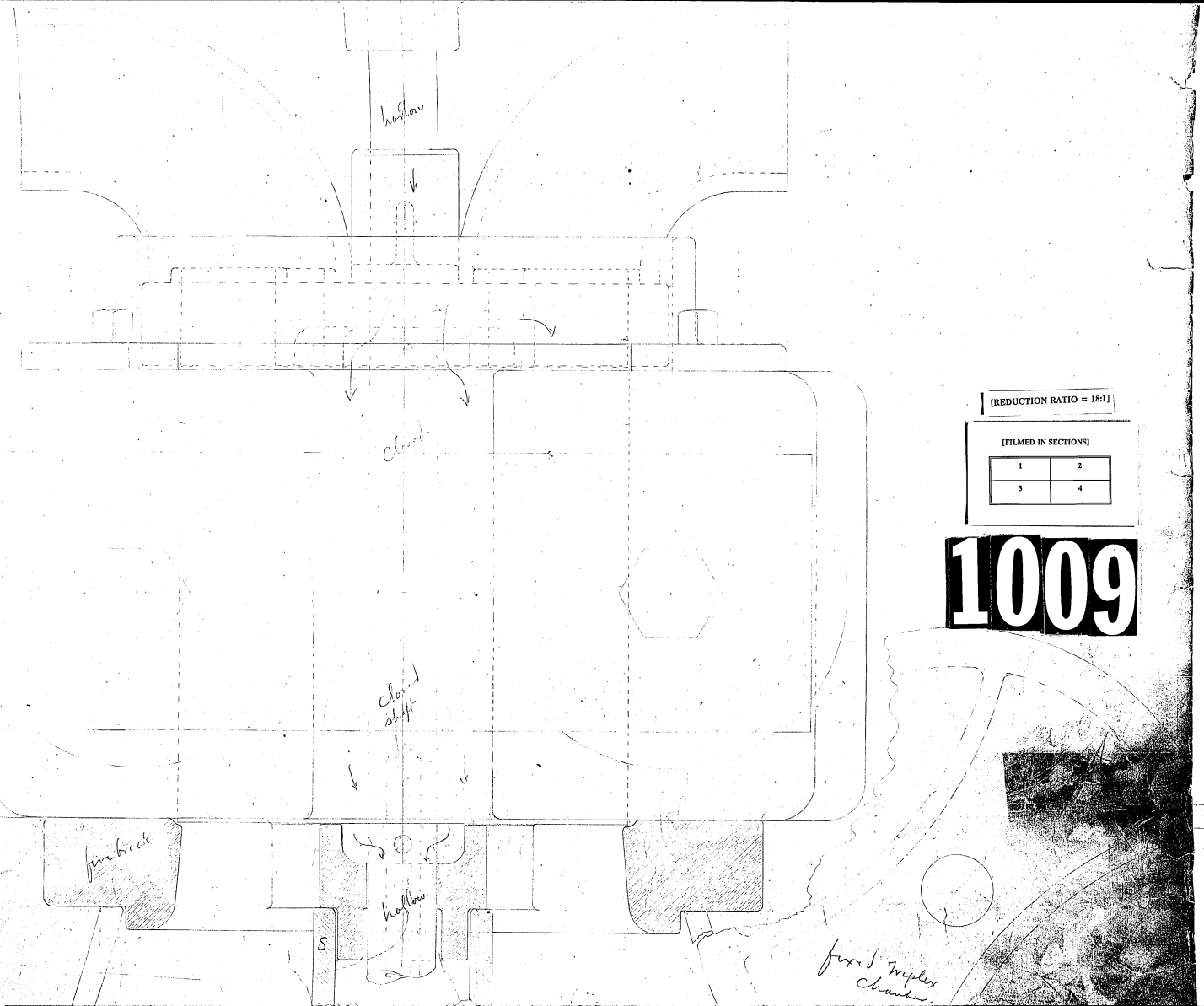


[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1	2
3	4

1008

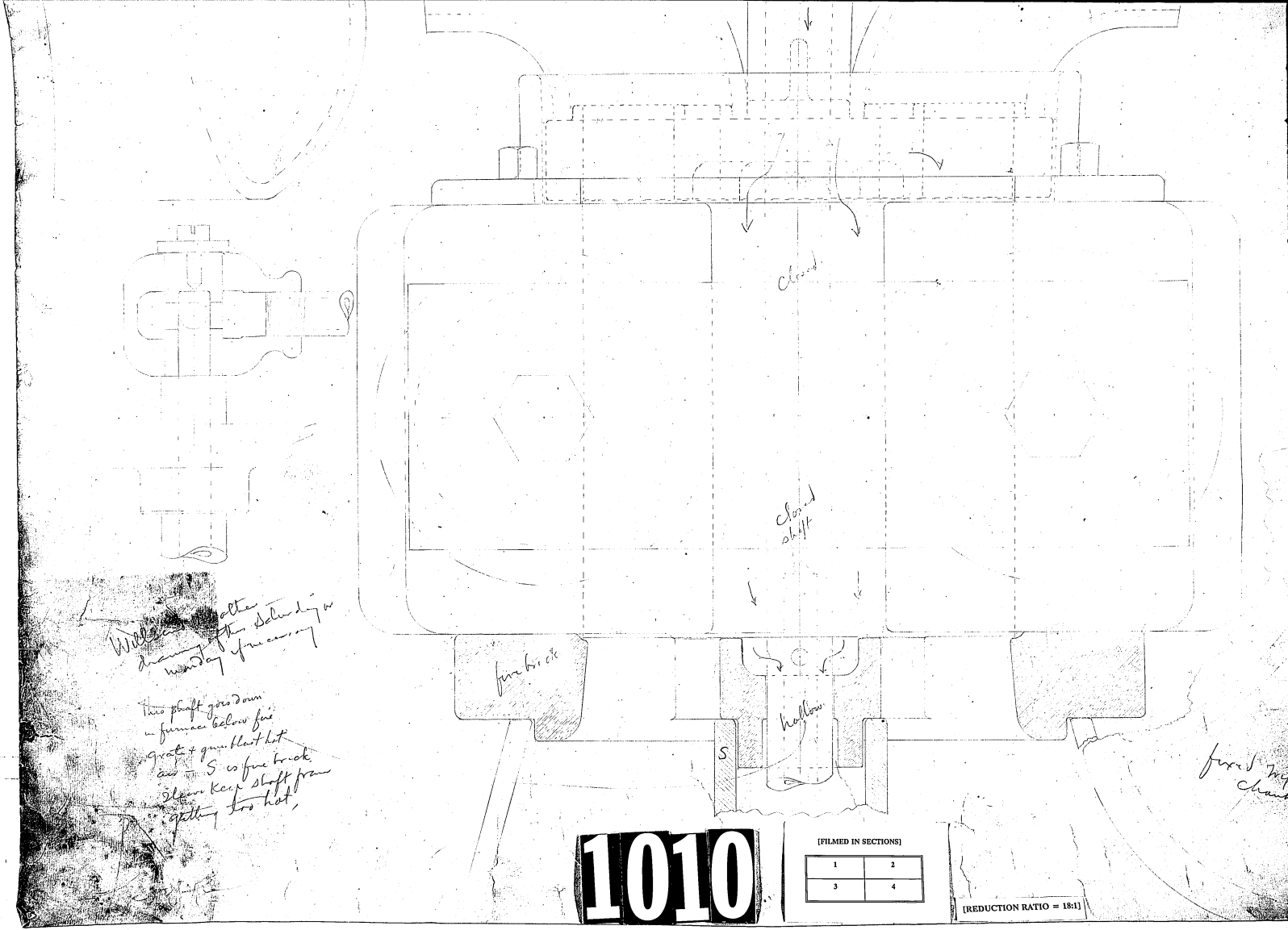


[REDUCTION RATIO = 18:1]

[FILMED IN SECTIONS]

1	2
3	4

1009

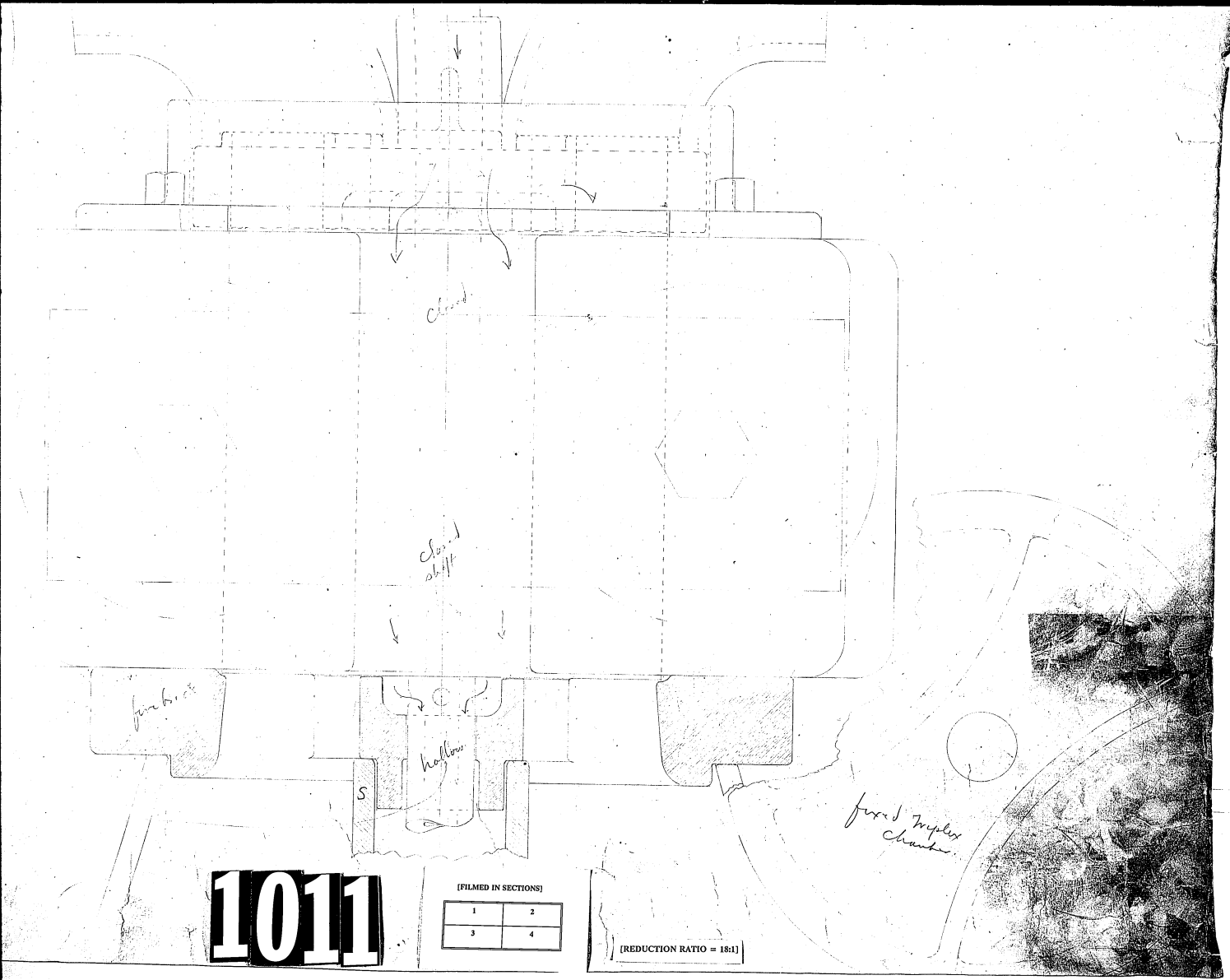


1010

[FILMED IN SECTIONS]

1	2
3	4

[REDUCTION RATIO = 18:1]



1011

[FILMED IN SECTIONS]

1	2
3	4

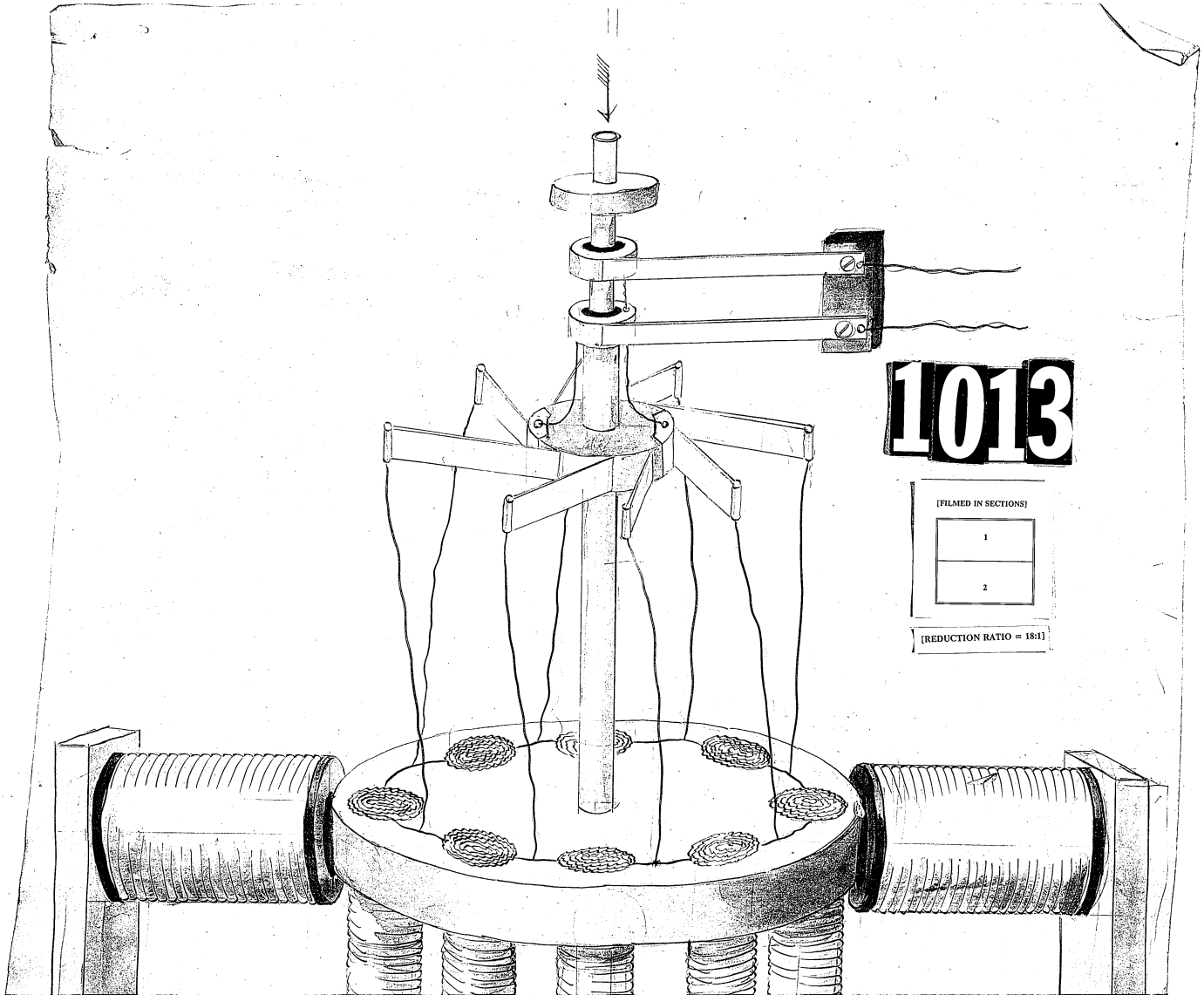
[REDUCTION RATIO = 18:1]

Lappan give this to Dyer & Lecky
from J.A.E.

1012

[ON BACK OF PRECEDING PAGE]

[REDUCTION RATIO = 18:1]



1013

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1
2

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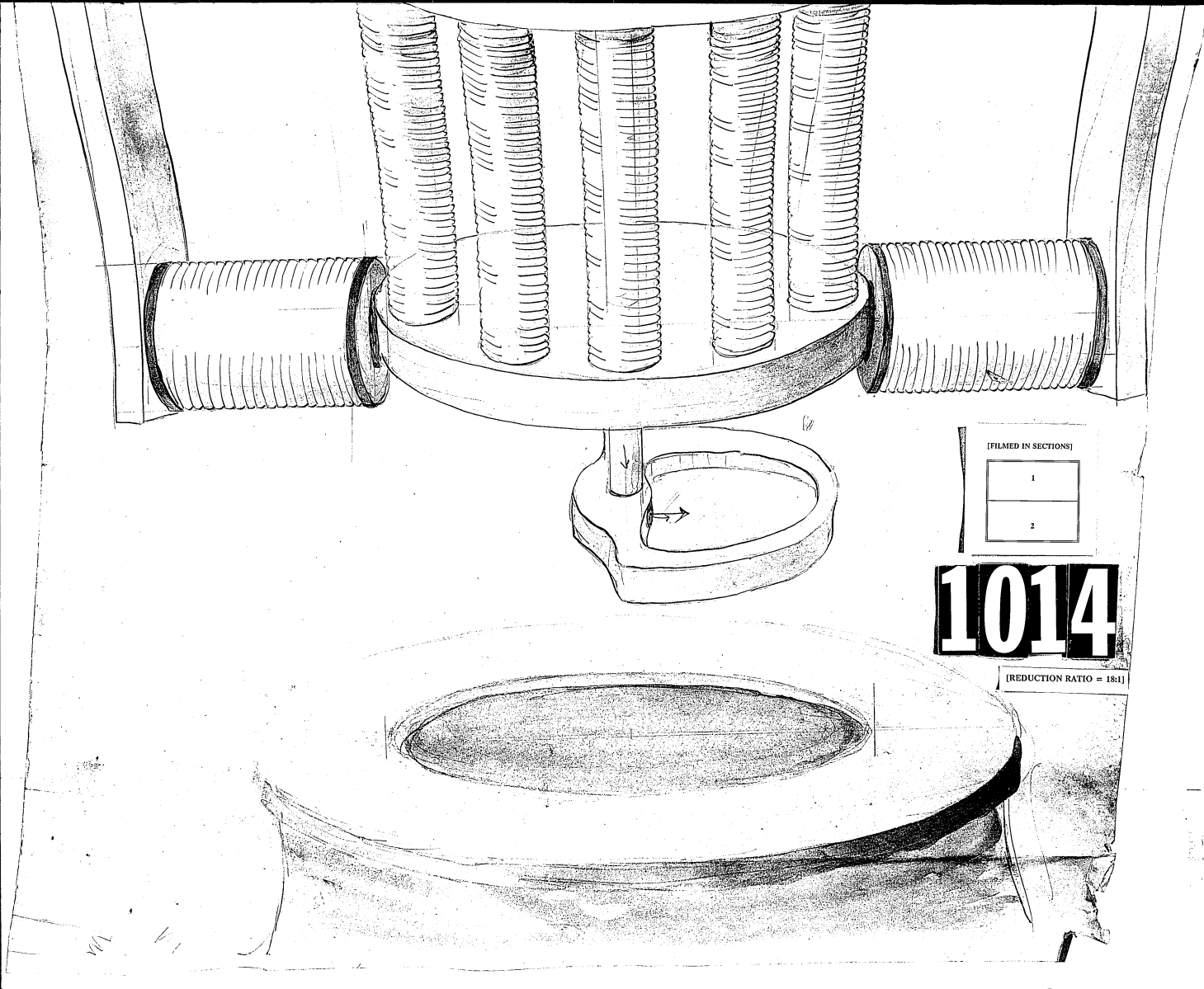
[FILMED IN SECTIONS]
1
2
1014
[REDUCTION RATIO = 18:1]

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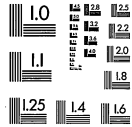

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